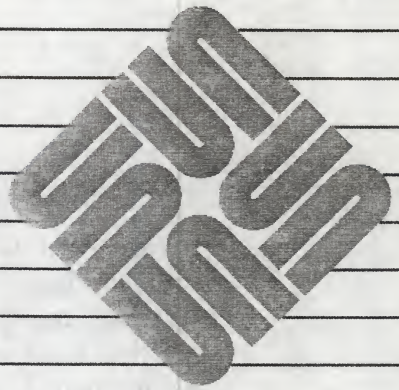
sun microsystems

SunIPC 1.2 User's Guide



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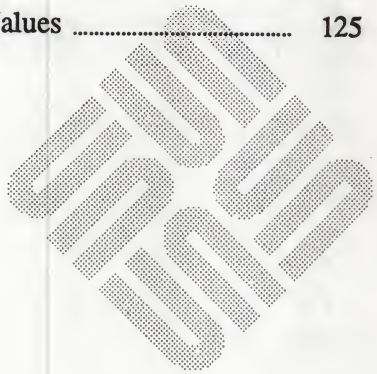

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Preface

Purpose and Objectives

This manual describes how to work with a SunIPC window on your Sun Workstation screen. It also contains information about gaining access to local and remote SunIPC boards, installing and running PC applications, and using I/O devices.

Audience

This manual is written for Sun Workstation users who plan to work with a SunIPC window. The following assumptions are made:

- There is already an accessible SunIPC board installed in a Sun system on your network.
- You know how to work with Sun Windows.
- You are already running `SunView` on your Sun system.

This manual does *not* assume that you have vast experience using PCs and PC application software.

Summary of Contents

This manual includes eight chapters:

Chapter 1

Introducing SunIPC — Gives an overview of SunIPC's components and capabilities.

Chapter 2

Getting Started — Describes opening a SunIPC window and selecting SunIPC menu options.

Chapter 3

Using Your Keyboard with SunIPC — Describes how the keys on Type2, Type3, and Type4 keyboards correspond to the keys on an IBM PC/AT keyboard.

Chapter 4

Using Disks — Explains how to work with floppy disks and with the SunIPC logical hard disk.

Chapter 5

Using Emulated I/O Devices — Explains how to connect I/O devices to the SunIPC parallel and emulated serial ports. This chapter also discusses using the emulated PC mouse and sending SunIPC data to printers.

Chapter 6	*Using the File Redirector* — Describes how to use the file redirector to gain access to the UNIX† file system.
Chapter 7	*Using PC-NFS* — Discusses using PC-NFS file access with SunIPC 1.2.
Chapter 8	*Advanced Topics* — Contains `pctool` command options and some SunIPC defaults.
Prerequisite Documents	None
Companion Documents	*SunIPC 1.2 Release Manual* *PC-NFS* *DOS User's Manual* *GWBASIC User's Manual*

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1

Introducing SunIPC 1.2

Welcome to SunIPC 1.2 — the Integrated Personal Computer for Sun Workstations. This chapter introduces you to SunIPC by describing its components and capabilities.

This chapter contains the following sections:

- *What is SunIPC?* — Contains a brief description of SunIPC and its capabilities.
- *Before You Continue...* — Lists the installation tasks that must be completed before you can use SunIPC.
- *What is SunIPC's Hardware and Software Environment?* — Describes the system's hardware and software components.
- *What Configurations Are Possible?* — Defines the different ways in which SunIPC boards can be installed on a network.
- *How Do I Communicate With SunIPC?* — Summarizes using Input/Output (I/O) devices to interact with SunIPC.
- *How Does SunIPC Differ From the IBM PC/AT?* — Outlines the ways in which SunIPC is functionally different from an IBM PC/AT computer.
- *How Do I Run PC Applications?* — Describes the ways in which you can run PC application software under SunIPC.
- *What is the File Redirector?* — Introduces the new SunIPC 1.2 access method for the UNIX file system: built-in support of the DOS `redir` and `extend` commands.
- *What is PC-NFS?* — Defines Network File System (PC-NFS) file access and describes how PC-NFS can extend SunIPC's capabilities.

1.1. What is SunIPC?

SunIPC is a hardware and software product that enables you to run PC applications under MS-DOS in a window on a Sun Workstation screen. Using a SunIPC window is like having a personal computer in addition to your Sun Workstation: SunIPC has its own MS-DOS file system, logical hard disk and (optional) floppy disk subsystem.

SunIPC 1.2 adds support for systems being upgraded to SunOS 4.0 and permits installation of SunIPCs into Sun-4 systems. SunIPC 1.2 does not make SunIPC 1.1 obsolete, however. That system is retained for SunOS 3.*x* users. SunIPC 1.2 is functionally compatible with SunIPC 1.1 but contains significant enhancements, including *cut and paste* functionality and fast, efficient access to UNIX file systems through the *file redirector*.

When you use a SunIPC window, you can run a PC application while you continue working with other Sun windows. In fact, if you have access to more than one SunIPC board, you can open *multiple* SunIPC windows and run two or more PC applications simultaneously. Chapter 2 tells you more about working with multiple SunIPC windows.

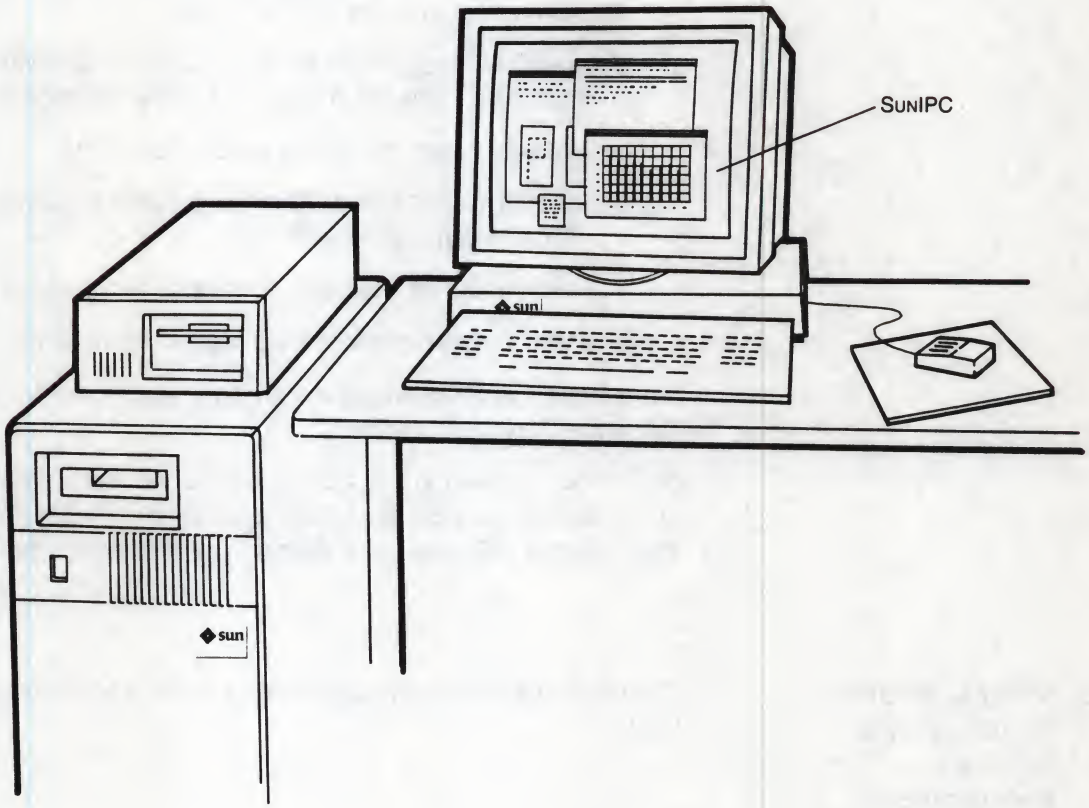
SunIPC 1.2 supports both local and remote access modes. Local access provides one user with exclusive access to a SunIPC board. Remote access provides a users who do not have boards installed access to a SunIPC board. These versions are described more fully in the section *What Configurations Are Possible?*.

You have two ways to exchange DOS and UNIX files in the SunIPC system: the *file redirector* and *PC-NFS*. The file redirector, one of the most useful enhancements provided by SunIPC 1.2, allows direct DOS file access through the UNIX file system without requiring you to configure the SunIPC as a separate machine on the network. This is possible through support of the DOS `redir` and `extend` commands. Both commands are included in the default `autoexec.bat` file and execute automatically at startup.

You can use SunIPC much like a PC connected to your network with PC-NFS. PC-NFS file access makes it possible for you to exchange file information between SunIPC and the Sun file system. If your network supports the Network File System (PC-NFS), then you can use data files on other systems with the PC applications you run in a SunIPC window. You can also share your "PC files" with other users on your network. For a more detailed summary of PC-NFS file access capabilities, see the manual *PC-NFS*.

Figure 1-1 shows a SunIPC window on a Sun Workstation screen. This figure also shows a SunIPC floppy disk subsystem at the side of the Sun Workstation keyboard.

Figure 1-1 *SunIPC Window on a Sun Workstation*



1.2. Before You Continue...

Before you use SunIPC, be sure that the following installation tasks are complete:

1. You (or another user) have installed a SunIPC board and (optional) floppy disk subsystem in a Sun Workstation on your network, as described in the *SunIPC 1.2 Release Manual*.
2. You (or another user) have rebuilt UNIX so that SunIPC can function properly.

3. If your network has a Yellow Pages service, your system manager has updated the Yellow Pages master database to incorporate the new SunIPC board(s). This procedure is described in the *SunIPC 1.2 Release Manual* and in Chapter 7 of this manual.
4. If you plan to use PC-NFS file access, your system manager has entered the Internet address of the new SunIPC board(s) in `/etc/hosts`, as described in the *SunIPC 1.2 Release Manual*.
5. If you plan to use PC-NFS file access, your system manager has set up the PC-NFS server files that you will be using.
6. Your system manager has given you a list of the available SunIPC boards on your network. This list should specify the following:
   - Which SunIPC boards are accessible to you
   - Which SunIPC boards have the optional floppy disk subsystem and/or 80287 math coprocessor
   - Which SunIPC boards have printers connected to them
   - Which network nodes have accessible modems

For information about single and multiple SunIPC boards, see the section *What Configurations Are Possible?*.

Once these installation tasks are complete, we recommend that you read the rest of this introductory chapter before opening and working with a SunIPC window. This material will give you a clearer idea of SunIPC's capabilities.

1.3. What is SunIPC's Hardware and Software Environment?

The following sections describe the hardware and software components of SunIPC.

Hardware

SunIPC hardware consists of a single coprocessor board that includes the following:

- 1 Megabyte of local memory available to SunIPC software, the MS-DOS operating system, and PC application software. 640 Kbytes of this memory can be used to run PC application software.
- 1 10 MHz Intel 80286 processor
- 1 parallel port

Emulated Hardware

SunIPC also provides the following emulated hardware:

- 2 emulated serial ports (maximum 2400 baud)
- As many as two logical hard disks (maximum 32 Mbytes each)
- 2 emulated printer ports (LPT1 and LPT3)
- Emulation of the Lotus/Intel memory expansion standard through Sun virtual memory

Optional Hardware

SunIPC optional hardware features include the following:

- 5 1/4" floppy disk subsystem (single- or dual-drive). For more information about using SunIPC floppy disk drives, see the section *How Do I Communicate With SunIPC?* and Chapter 4 of this manual.
- 8 MHz 80287 math coprocessor

Software

SunIPC 1.2 runs under SunOS versions 4.0 and later.

SunIPC software includes the following:

- MS-DOS operating system 3.3.
- Access to the UNIX file system by way of the file redirector.
- DOS extensions — These are additional utilities that are compatible with IBM's PC-DOS operating system.
- GWBASIC interpreter version 3.22 — This software is compatible with IBM's BASICA.
- PC-NFS file access

For a complete description of the DOS commands and utilities that SunIPC supports, see the *DOS User's Manual*.

1.4. What Configurations Are Possible?

This section defines and contrasts the following optional configurations for SunIPC boards:

- Local and remote access
- Single and multiple boards
- Use of the 80287 floating-point coprocessor
- Use of single or dual floppy disks

The command line for opening a SunIPC window varies, depending on the board's configuration. Chapter 2 describes the command lines for all possible SunIPC board configurations.

Local and Remote Access

As mentioned earlier in this chapter, you can access SunIPC in two ways. *Local access* offers you exclusive use of a local SunIPC board installed in your Workstation. *Remote access* offers an unlimited number of users shared access to a SunIPC board installed elsewhere on your network. Only one user at a time can use the remote SunIPC board, however.

The remote access mode of SunIPC provides users with shared, *not* simultaneous, access to a SunIPC board.

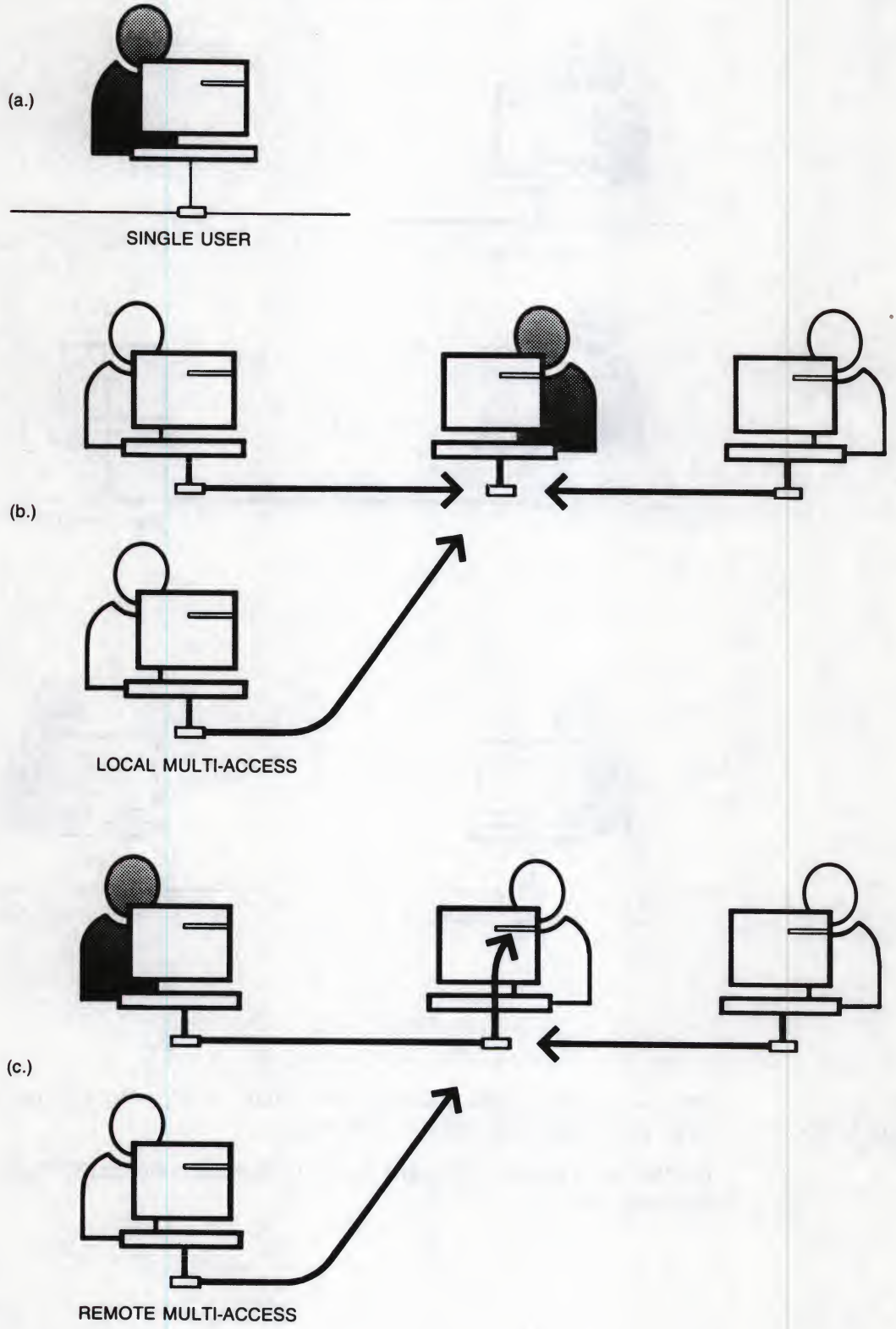
If you have exclusive access to a SunIPC board, you can use SunIPC whenever you choose. If you have remote access, however, there may be additional SunIPC boards on your network that you can use if the first board is engaged. If this is true, be sure your system manager gives you a list of available SunIPC boards as described in the section *Before You Continue....*

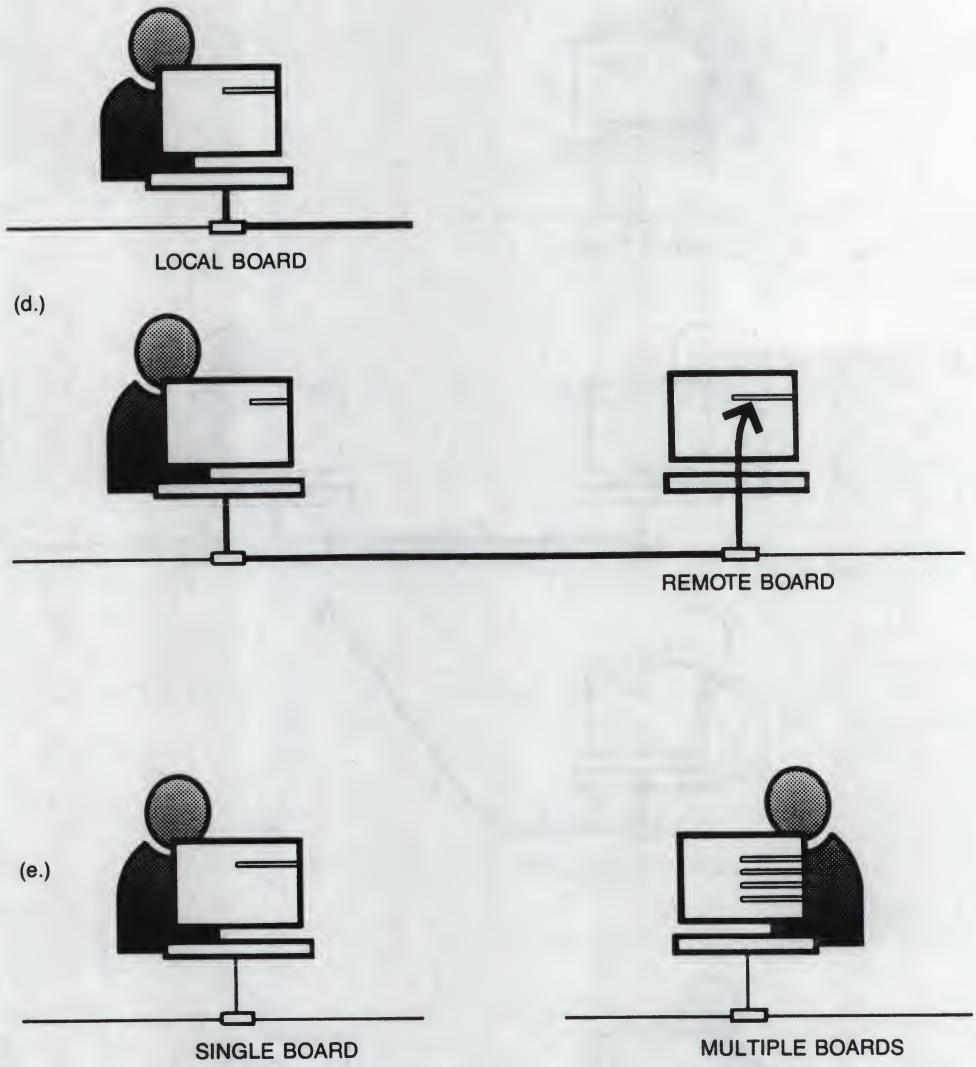
Single and Multiple Boards

It is possible to install as many as four SunIPC boards on a Sun Workstation. Therefore, a Workstation can have *single* or *multiple* SunIPC boards. If a Workstation has more than one SunIPC board, you might want to know which boards have one or both of the optional hardware features described in the section *What is SunIPC's Hardware and Software Environment?*.

Figure 1-2 illustrates the different configurations of SunIPC boards.

Figure 1-2 *SunIPC Configurations*





1.5. How Do I Communicate With SunIPC?

You can consider your interaction with a SunIPC window from the perspective of either a Sun Workstation user or a PC user.

The following sections summarize using I/O devices with SunIPC from both of these perspectives.

As a Sun Workstation User

If you are a Sun Workstation user, working with a SunIPC window is much like working with any other Sun window. You can use your Sun mouse to pop up the `frame menu` and open, move, close, or quit a SunIPC window. In addition, you can pop up the SunIPC menu to do the following:

- Copy and paste
- Change display adaptors
- Attach and detach the PC mouse
- Send data to a printer
- Use the SunIPC keyboard speaker
- Reset SunIPC hardware
- Exit the SunIPC window

Some minor differences between a SunIPC window and most other Sun windows are described in Chapter 2.

As a PC User

If you are a PC user, SunIPC provides the following familiar features:

- (Logical) hard disk
- Floppy disk drive
- Microsoft bus mouse
- IBM PC/AT keyboard emulation
- Multiple display adaptors
- PC peripherals
- Lotus/Intel memory expansion standard

Logical Hard Disks

Each SunIPC board is associated with as many as two *logical hard disks*. You can use MS-DOS commands on a logical, or emulated, hard disk to perform standard operations such as checking available disk space and copying files from floppy disk. It is recommended that you set the size of this hard disk after you finish installing your SunIPC board. You can also create a second logical hard disk, drive D, if you want additional storage or if you want to resize drive C but still maintain access to files that were on drive C.

For complete information about performing these operations on a SunIPC logical hard disk, see Chapter 4.

Floppy Disk Drive

As mentioned in the section *What is SunIPC's Hardware and Software Environment?*, the *floppy disk subsystem* is an optional SunIPC feature. The floppy disk subsystem comes in two versions: single-drive and dual-drive.

The SunIPC *single-drive* floppy disk subsystem can read and write to 1.2 Mbyte floppy disks and can read 360 Kbyte floppy disks. This floppy disk subsystem accepts high-density, double-sided floppy disks.

The SunIPC *dual-drive* floppy disk subsystem can read and write to both 1.2 Mbyte and 360 Kbyte floppy disks. The 1.2 Mbyte drive (the A drive) accepts high-density, double-sided floppy disks. The 360 Kbyte drive (the B drive) accepts double-density, double-sided floppy disks.

If you have a floppy disk drive, you can run PC applications from floppy disks and use MS-DOS commands to perform standard operations such as comparing two floppy disks (dual-drive only).

For more information about using both versions of the SunIPC floppy disk subsystem, see Chapter 4.

Microsoft Bus Mouse

After you open a SunIPC window, you can select an item on the SunIPC menu that causes your Sun mouse to emulate a *Microsoft bus mouse*. You can then run PC applications such as PC Paint, Flight Simulator, and other applications that accept mouse input.

IBM PC/AT Keyboard Emulation

When you work with SunIPC, your Sun keyboard takes the place of an IBM PC/AT keyboard. This is possible through *keyboard mapping*.

With this manual, you received a template that fits on your Sun keyboard. This template shows you how Sun Type2 and Type3 keyboard keys map, or correspond to, IBM PC/AT keyboard keys. Type4 keyboards correspond so closely to the IBM PC/AT keyboard that the template is not necessary with these keyboards.

For detailed instructions on using your Sun keyboard as you would an IBM PC/AT keyboard, see Chapter 3.

Multiple Display Adaptors

SunIPC emulates three types of display adaptors used by PC applications:

- IBM AT monochrome adaptor — 640 x 400 pixels
- Hercules monochrome adaptor — 720 x 348 pixels
- IBM AT color graphics adaptor — 640 x 400 pixels

For instructions on changing display adaptors while working with SunIPC, see Chapter 2.

PC Peripherals

You can use the parallel port on a SunIPC board to connect existing (parallel) PC peripherals and use them when you work with SunIPC. For information about sending data to a printer in this way, see Chapter 5.

Memory Expansion Standard

SunIPC supports the Lotus/Intel memory expansion standard. This means that SunIPC lets you work with large spreadsheets such as those you might use with Lotus 1-2-3. Through this memory expansion standard, each SunIPC board can provide up to 4 Mbytes of additional memory.

If you plan to use the expanded memory, you need to edit two files related to the SunIPC board that you are using:

1. The `config.sys` file on drive C.
2. The configuration file `/usr/share/pctool/config.pc`*x*. (This file is described fully in Chapters 4 and 5.)

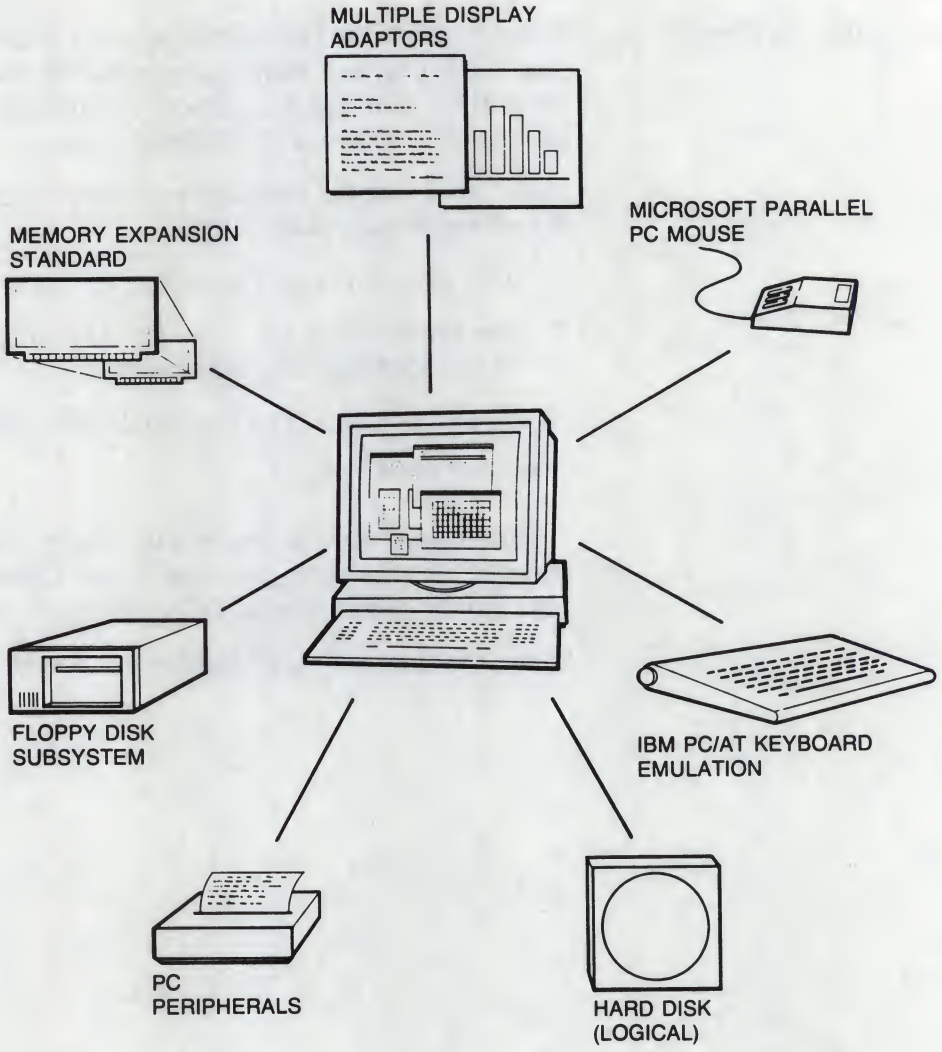
To edit the `config.sys` file, add the following line:

```
device=pemm.sys
```

For information about how to edit the SunIPC board's configuration file prior to using the memory expansion standard, see Chapter 5. For information about the other SunIPC parameters that the configuration file controls, see Chapter 8.

Figure 1-3 illustrates the PC features that SunIPC provides or emulates.

Figure 1-3 *Familiar PC Features*



The preceding sections summarized the ways in which working with SunIPC resembles working with a PC. The next section describes the *differences* between SunIPC and an IBM PC/AT.

1.6. How Does SunIPC Differ From the IBM PC/AT?

SunIPC differs from the IBM PC/AT in a few ways. Specifically, SunIPC does not do the following:

- Support peripherals over an AT bus
- Support all IBM PC/AT display adaptors
- Provide a multi-tone speaker
- Include a floppy disk subsystem for every SunIPC board

The following sections elaborate on these differences.

No AT Bus

SunIPC can support the use of peripherals through the following:

- The parallel port on the SunIPC board itself
- The emulated serial ports on the Sun Workstation in which the board is installed
- Physical printers associated with the MS-DOS logical device names LPT1 and LPT3
- The file redirector
- PC-NFS file access

SunIPC does not, however, support the use of an AT bus. This means that when you work with a SunIPC window, you cannot use peripherals that must send data over an AT bus.

For information about using physical and emulated I/O devices with SunIPC, see Chapters 4 and 5.

Unsupported Display Adaptors

SunIPC does not support any IBM PC/AT display adaptors not described in the section *Multiple Display Adaptors*. Application programs that depend on the presence of these display adaptors cannot run under SunIPC.

No Multi-tone Speaker

The SunIPC keyboard speaker emulates the IBM PC/AT speaker, but with a single tone only. This means that the SunIPC keyboard speaker cannot duplicate the varied frequencies produced by some PC applications or play tunes.

Optional Floppy Disk Subsystem

Because the SunIPC floppy disk subsystem is an optional feature, you will not necessarily have the use of a floppy drive. If you do have a floppy disk subsystem, you can use floppy disks to run PC applications and store data files. If you do not have a floppy disk subsystem, you must store your PC applications and data files on the SunIPC logical hard disk or on the disk of a network server. For information and recommendations on installing PC applications in these ways, see Chapter 4.

1.7. How Do I Run PC Applications?

When you work with a SunIPC window, you can run PC application software using three different methods:

1. Run the application directly from a floppy disk inserted in the (optional) SunIPC floppy disk subsystem.
2. Install the application on the SunIPC logical hard disk and run the software from there.
3. Install the application on the UNIX file system and gain access to it through the file redirecor.
4. Use PC-NFS.

The performance of graphics-based PC applications may suffer if you are using these applications over the network. If this occurs, it is recommended that you install a SunIPC board in the Sun system where you (and other users) want to execute graphics applications.

When running these PC applications, you must use the version for the IBM PC/AT, as indicated on the application package.

Chapter 4 contains information about working with floppy disks and with the SunIPC logical hard disk. Chapter 4 also contains recommendations and cautions on installing PC applications. For information about using the file redirector to gain access to UNIX files, see Chapter 6. For information about mounting PC-NFS file systems, see the manual *PC-NFS*.

1.8. What is the File Redirector?

One of the most significant enhancements in SunIPC 1.2 is the inclusion of the *file redirector*. The redirector gives you direct access to the UNIX file system from within MS-DOS. It does this by allowing virtual DOS drives to be extended, or assigned to, UNIX directories. Through the extended drives, you can access all the files on the Sun file system.

The redirector software consists of two programs:

- `redir`
- `extend`

`redir` is a small resident program that *redirects* access to certain drives to the Sun. It takes no arguments, and must be run before you run `extend`.

`extend` is the user interface program for the redirector. It handles the management of the redirection. For example, the following form of the `extend` command allows redirection to a Sun pathname that may contain environment

variables:

```
> extend d:path-prefix
```

To see your current list of redirected file systems, you can simply type

```
> extend
```

Complete details on the `extend` command and its arguments are included in Chapter 6, *Using the File Redirector.*

1.9. What is PC-NFS?

As a Sun Workstation user, you may already be familiar with Network File System (NFS) file access. If you haven't used NFS file access before, read this section for a brief overview.

NFS is an *interface* that allows various computers, operating systems and networks to share files. Computers can use NFS to interact in two different ways: as servers and as clients. An NFS *server* is a computer that provides resources (such as disk storage space) to other machines on a network. An NFS *client* is a computer that uses these remote resources. A single computer may use NFS to play either or both of these roles on a network.

PC-NFS allows the SunIPC to act as a client on an NFS network. Thus, when you extend SunIPC in this way, your SunIPC window has the same access to network resources as an independent client machine has.

You can use PC-NFS commands with SunIPC to do the following:

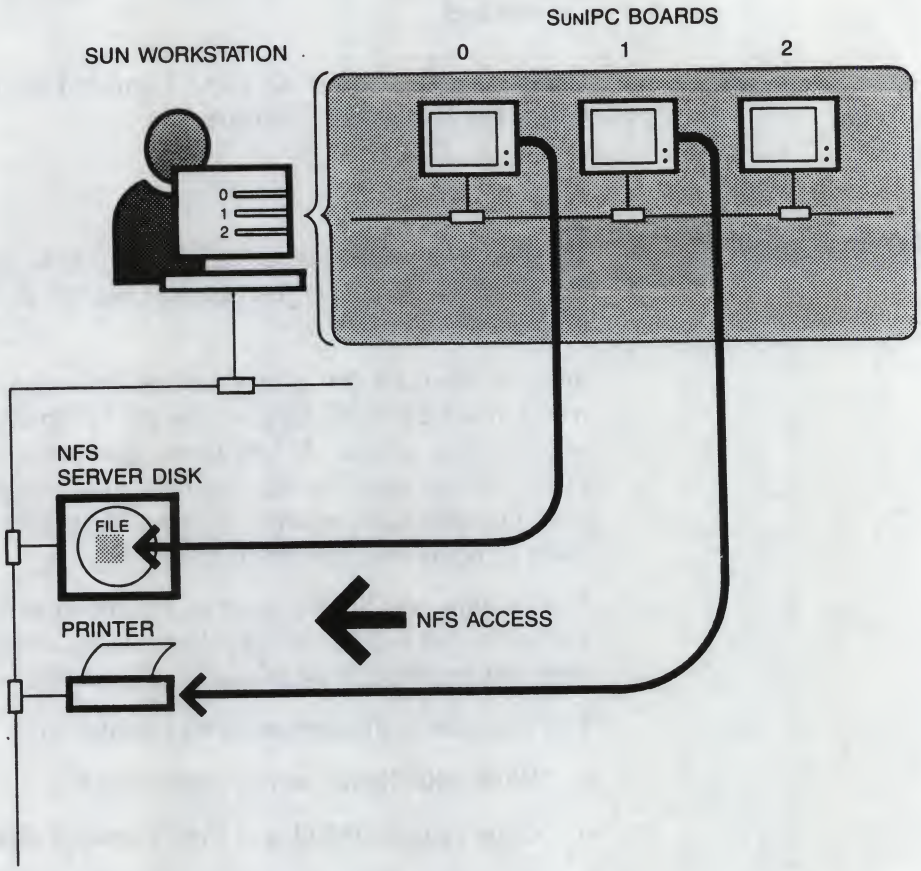
- Work with files on an NFS server's disk
- Copy your SunIPC files to an NFS server's disk
- Use remote printers and other peripherals

Copying your PC files to an NFS server's disk is doubly useful: you can share your files with other users *and* minimize your file backups.

Before you can work with PC-NFS, you or your system manager must set up access to the remote file systems you plan to use. If you do not know whether PC-NFS access to these file systems has been arranged, check with your system manager.

Figure 1-4 illustrates how you can work with remote file systems through SunIPC's *logical disk drives*. This figure shows a user with access to a file system on the disk of an NFS server.

Figure 1-4 *PC-NFS File Access with SunIPC*



For information about using SunIPC logical drives, see Chapter 4 and the manual *PC-NFS*.

1.10. What's Next?

This chapter presented a general introduction to SunIPC 1.2. You can now continue with Chapter 2, *Getting Started*. Chapter 2 shows you how to open and work with a SunIPC window.

2

Getting Started

Getting Started **21**

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2

Getting Started

This chapter shows you how to open and work with a SunIPC window. It contains the following sections:

- *Opening a SunIPC Window* — Describes SunIPC window options. This section presents the command lines for opening a window with all possible SunIPC board configurations. In addition, this section discusses working with multiple SunIPC windows.
- *How is a SunIPC Window Different From Other Sun Windows?* — Summarizes the ways in which a SunIPC window behaves differently from the other windows on your Sun Workstation screen.
- *Selecting SunIPC Menu Items* — Describes using the SunIPC menu to modify a SunIPC window. This section also shows you how to exit a SunIPC window.

The first section in this chapter uses an extended example to illustrate how a group of users might share SunIPC boards.

We assume that you already know how to work with Sun Workstation windows. If you have never used Sun windows before, learn the basics before you use SunIPC. For information about manipulating and modifying Sun windows, see *Windows and Window Based Tools: Beginner's Guide*. This manual is part of the documentation that arrived with your Sun Workstation.

You must be running `SunView` on your Sun system before you can open and work with a SunIPC window.

2.1. Opening a SunIPC Window

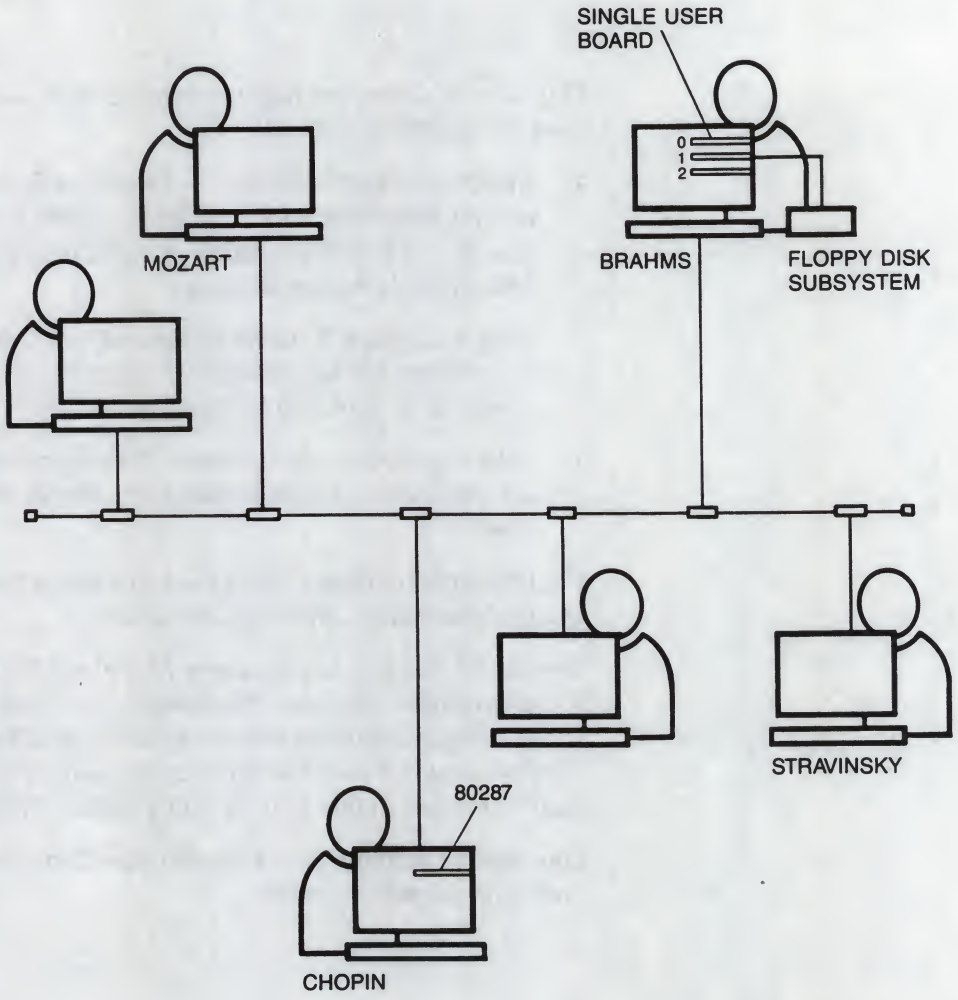
You can install as many as four SunIPC boards on a Sun Workstation. It is thus possible to open a SunIPC window by specifying any of the following:

- A single local board
- A single remote board
- One of multiple local boards
- One of multiple remote boards

This section describes specifying both local and remote SunIPC access when you open a SunIPC window.

The examples in this chapter are based on the arrangement of network nodes shown in Figure 2-1 .

Figure 2-1 *SunIPC Boards on a Network*



The preceding figure shows network nodes `Brahms`, `Chopin`, `Mozart`, and `Stravinsky`. Node `Brahms` has three SunIPC boards. Node `Chopin` has one SunIPC board. Neither node `Mozart` nor node `Stravinsky` has a local SunIPC board. Also note that the first SunIPC board on node `Brahms` has local access only, and the second SunIPC board on node `Brahms` has a floppy disk

drive. The (only) SunIPC board on node `Chopin` has an 80287 floating-point coprocessor. Except for the first SunIPC board on node `Brahms` (which can only be accessed by the user working at that node), all of the SunIPC boards on this sample network have remote access.

Table 2-1 summarizes the SunIPC board configurations in this sample network.

Table 2-1 *SunIPC Board Configurations*

BRAHMS	CHOPIN	MOZART	STRAVINSKY
3 boards 1 floppy disk drive 1 single-access board	1 board 1 80287 floating point processor	0 boards	0 boards

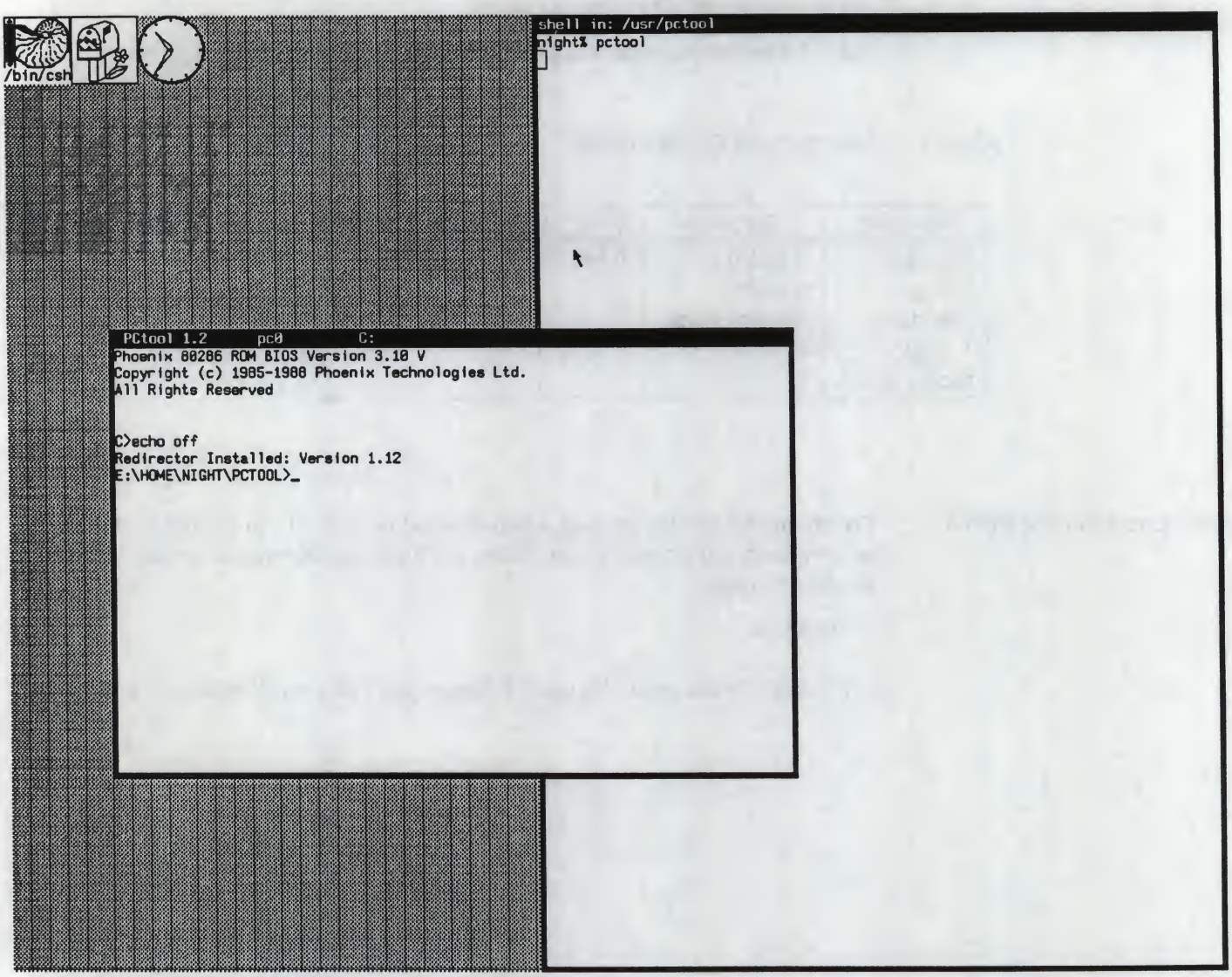
Using a Local SunIPC Board

The command line for opening a SunIPC window with a local SunIPC board can be very short and simple. From `Chopin`, for example, you can open a SunIPC window by typing

```
% pctool
```

A window like the one in Figure 2-2 then appears on your Workstation screen.

Figure 2-2 *Initial SunIPC Window*



When you open a SunIPC window, the window border displays the number of the SunIPC board you are using. The SunIPC window border also displays the SunIPC version number and indicators for three keyboard features that are described in Chapter 3.

Including an Application Name

To open a SunIPC window directly into a PC application, type

```
% pctool -c commands
```

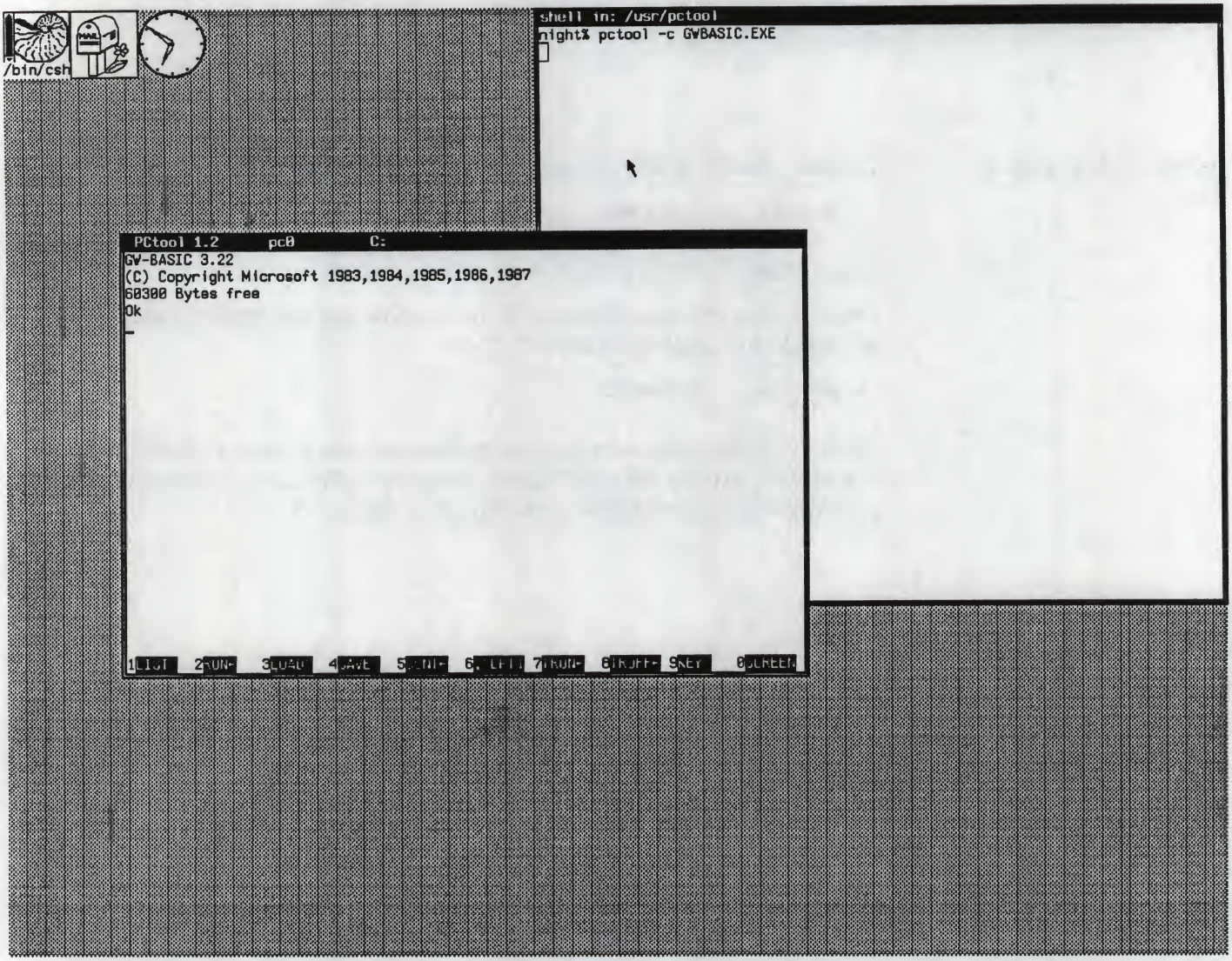
where *commands* is the text you want `pctool` to use on start-up.

Let us assume you want to open a SunIPC window and use GWBASIC, which arrived already installed on drive C. Type

```
% pctool -c GWBASIC
```

When the SunIPC window opens, the application name appears after the first MS-DOS prompt. After a few more moments, the initial GWBASIC screen appears and your Workstation screen looks something like Figure 2-3 .

Figure 2-3 *GWBASIC SunIPC Window*



Specifying a PC application name in this way does more than save you a line of typing. You can use this feature to start up a lengthy command procedure that executes while you do other things. You can also pass an application name this way when you open a SunIPC window as an icon. (See the next section for more information.)

You can save yourself more typing by including *aliases* in the `cshrc` or `login` files in your UNIX home directory. For example, you could enter the following command line in your `cshrc` file:

```
% alias BAS "pctool -c GWBASIC"
```

This alias lets you open a SunIPC window and run GWBASIC by typing

```
% BAS
```

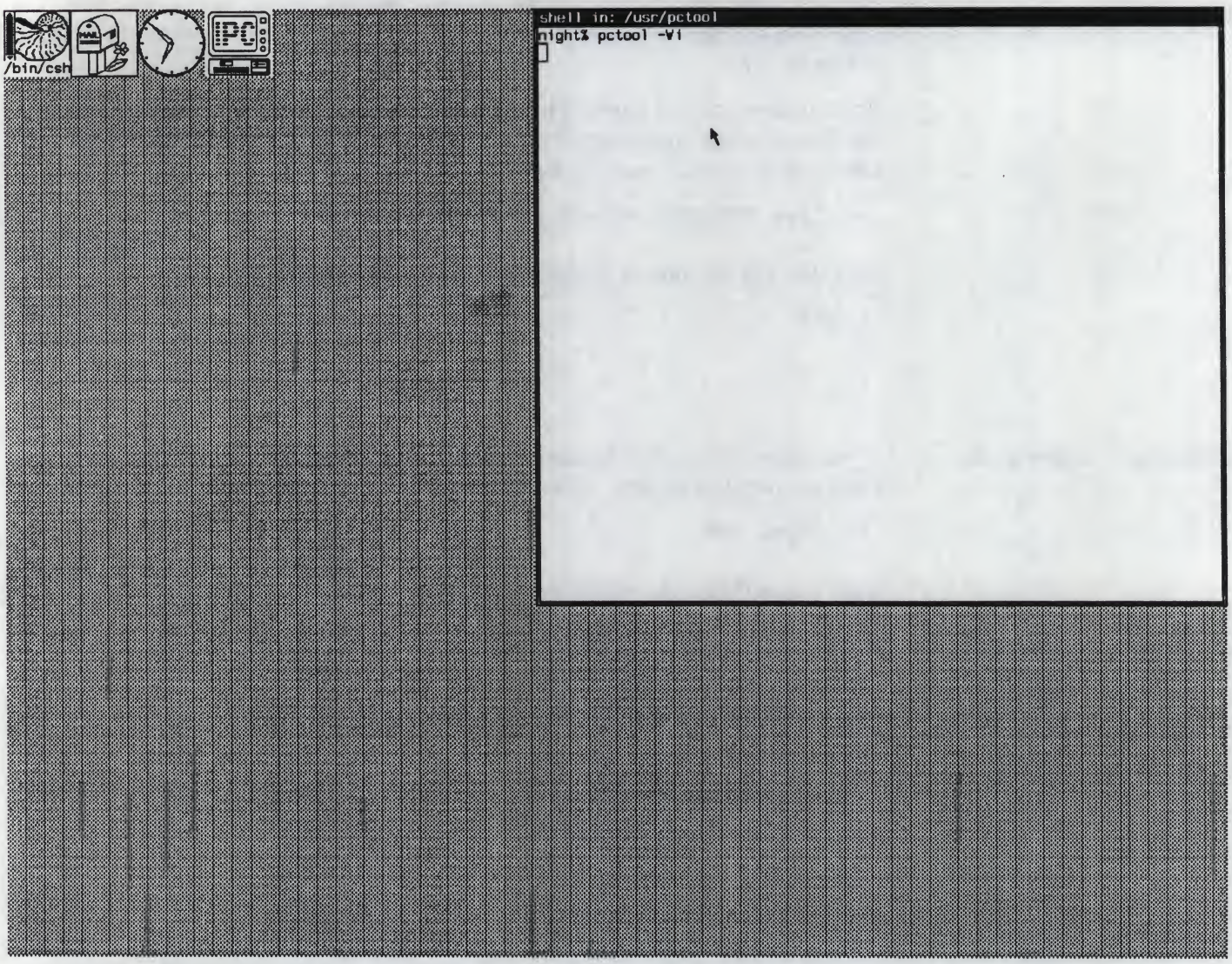
Opening the Window as an Icon

If you know that you will be using a SunIPC window soon but not immediately, you can open it as an icon. To do this, type

```
% pctool -Wi
```

Your screen then looks something like Figure 2-4 .

Figure 2-4 *The SunIPC Icon*



You can now open a SunIPC window by moving the cursor to the SunIPC icon and pressing the left mouse button.

If you want to open a SunIPC window as an icon each time you restart the window system, include the line **`pctool -Wi`** in your `.sunview` startup file.

You can also combine this feature with the one described in the section *Including an Application Name*. For example, the following command line lets you open a SunIPC window as an icon and invisibly execute a command procedure called `setup`. Later, when you are ready to open the SunIPC window, move the cursor to the SunIPC icon and press the left mouse button.

```
% pctool -Wi -c setup
```

If others may want to use your SunIPC board with remote access, it is generally not a good idea to open a SunIPC window as an icon.

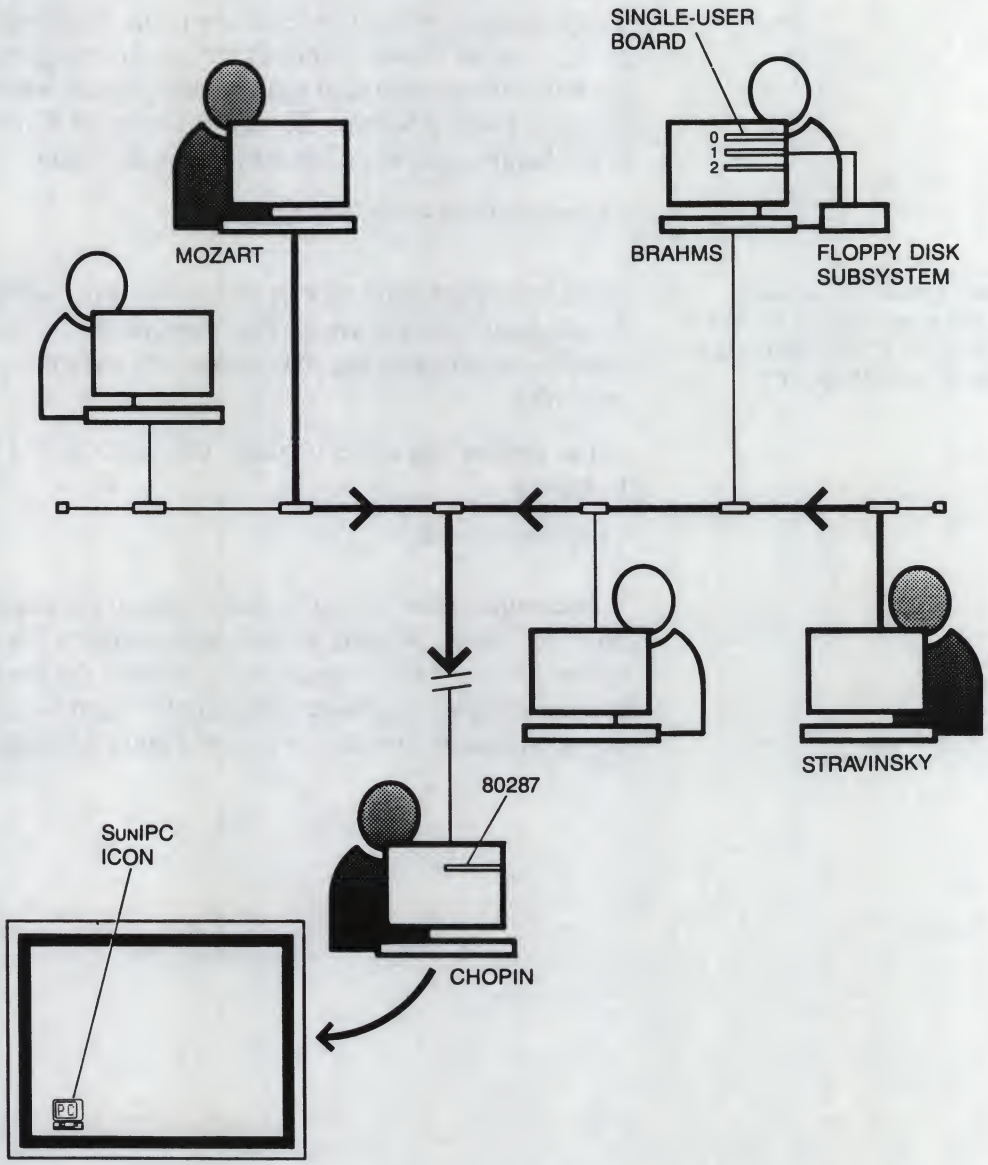
When the SunIPC icon appears on your screen, no one else can have access to the SunIPC board you are using. Therefore, if you are sharing a SunIPC board with other users, ornamenting your screen with the icon is not an efficient use of resources.

Let us assume that a user on node `Chopin` opens a SunIPC window as an icon by typing

```
% pctool -Wi
```

This command line gives this user access to the single local SunIPC board on node `Chopin`. As long as the icon remains on this user's screen, users on nodes `Mozart` and `Stravinsky` cannot use the SunIPC board on `Chopin`. If these users want to work with a SunIPC window, they must access the second and third boards on node `Brahms`. Figure 2-5 illustrates this scenario.

Figure 2-5 *Monopolizing a SunIPC Board*



The next section describes how to gain access to a remote SunIPC board.

Specifying a Remote SunIPC Board

Read this section if you have remote access to one or more SunIPC boards on your network. If you are using a local SunIPC board, you can skip to the section *Working with Multiple SunIPC Windows*.

You might decide to specify a remote SunIPC board for any of these reasons:

- You do not have a local SunIPC board.
- You need to use a board that has an 80287 coprocessor or a floppy disk subsystem.
- Another user is using your local board.

Ask your system manager to tell you which SunIPC boards on your network have the optional 80287 coprocessor and/or floppy disk subsystem. For more information about these SunIPC features, see Chapters 1 and 4, respectively.

To specify a remote SunIPC board, type

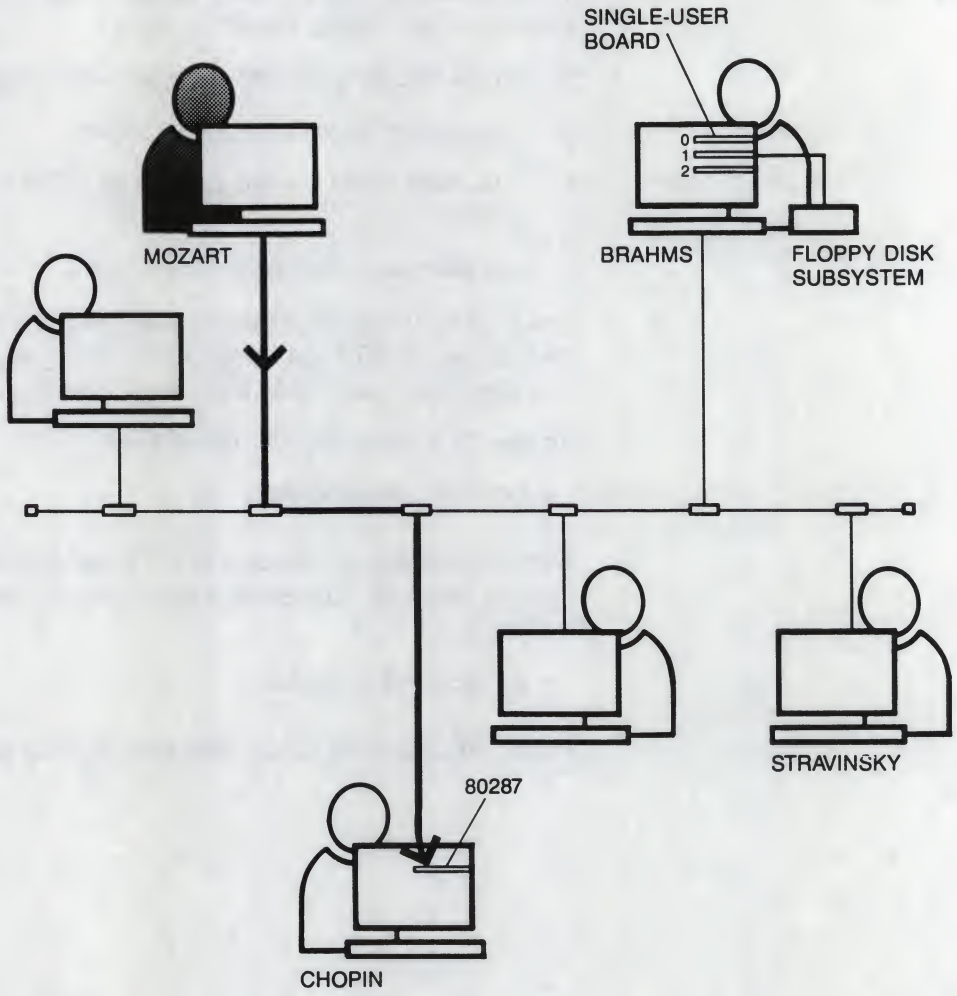
```
% pctool -d nodename:
```

where *nodename*: is the name of the network node on which the remote SunIPC board is installed. Therefore, a user on node `Mozart` can use a SunIPC window by typing

```
% pctool -d chopin:
```

Figure 2-6 shows the current SunIPC board use on our sample network.

Figure 2-6 *Access to a Remote SunIPC Board*



If Your Station Has Multiple SunIPC Boards...

This section describes how to specify one of multiple local or remote boards.

Multiple Local Boards

It is possible to install as many as four SunIPC boards on a Sun Workstation. If your Workstation has multiple local boards, you have two ways to open a SunIPC window:

1. If you don't need to use a particular board, type

   ```
   % pctool
   ```

   When you use this command line, you get access to the first available local board.

2. If you *do* need to use a particular local board, ask your system manager for the board's assigned number. Then type

   ```
   % pctool -d /dev/pcx
   ```

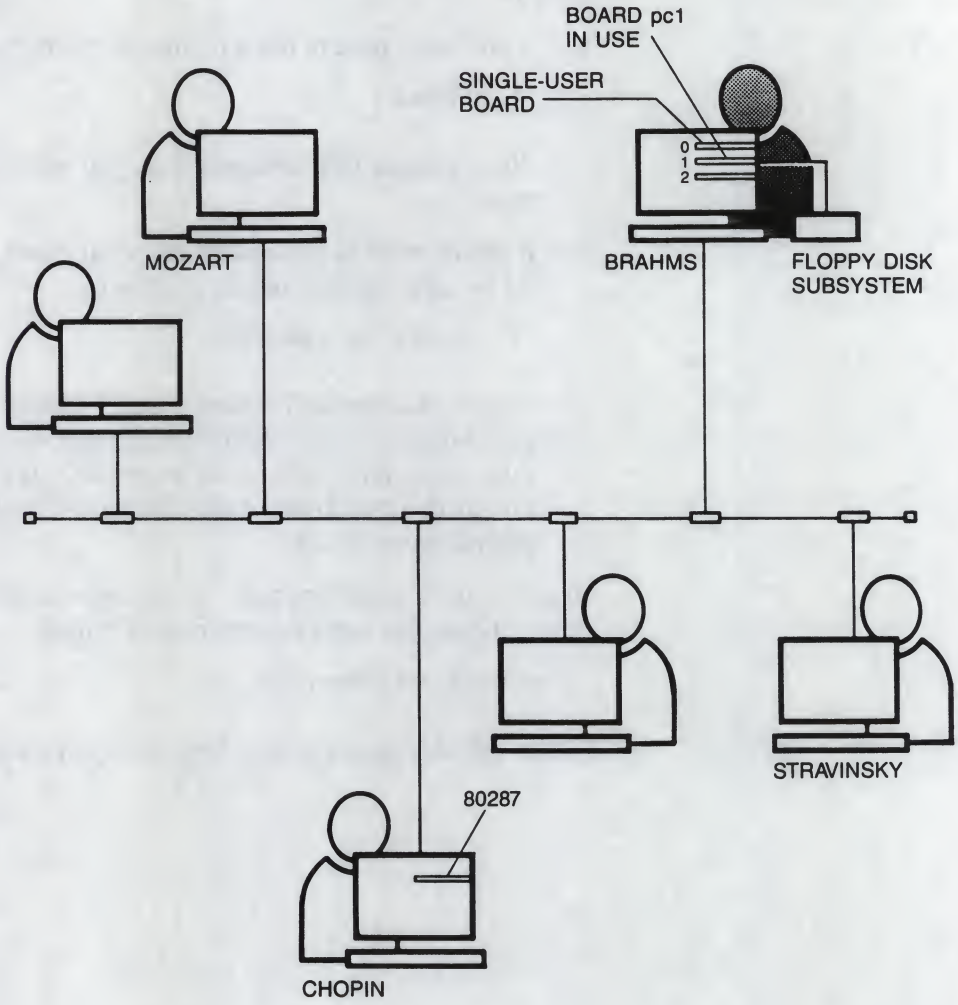
   where *x* is a number between 0 and 3. (These numbers are determined by your system manager during the installation of the SunIPC board.) The path `/dev/pcx` refers to a file in the standard UNIX device directory. Use exactly this form; other substitutions for the device name may cause unpredictable results.

Return to our sample network. A user on node `Brahms` could use the local SunIPC board that has a floppy drive by typing

```
% pctool -d /dev/pc1
```

Figure 2-7 illustrates this new way of specifying a local SunIPC board.

Figure 2-7 *Access to One of Multiple Local SunIPC Boards*



Multiple Remote Boards

To specify one of multiple *remote* SunIPC boards, type

```
% pctool -d nodename:/dev/pcx
```

where

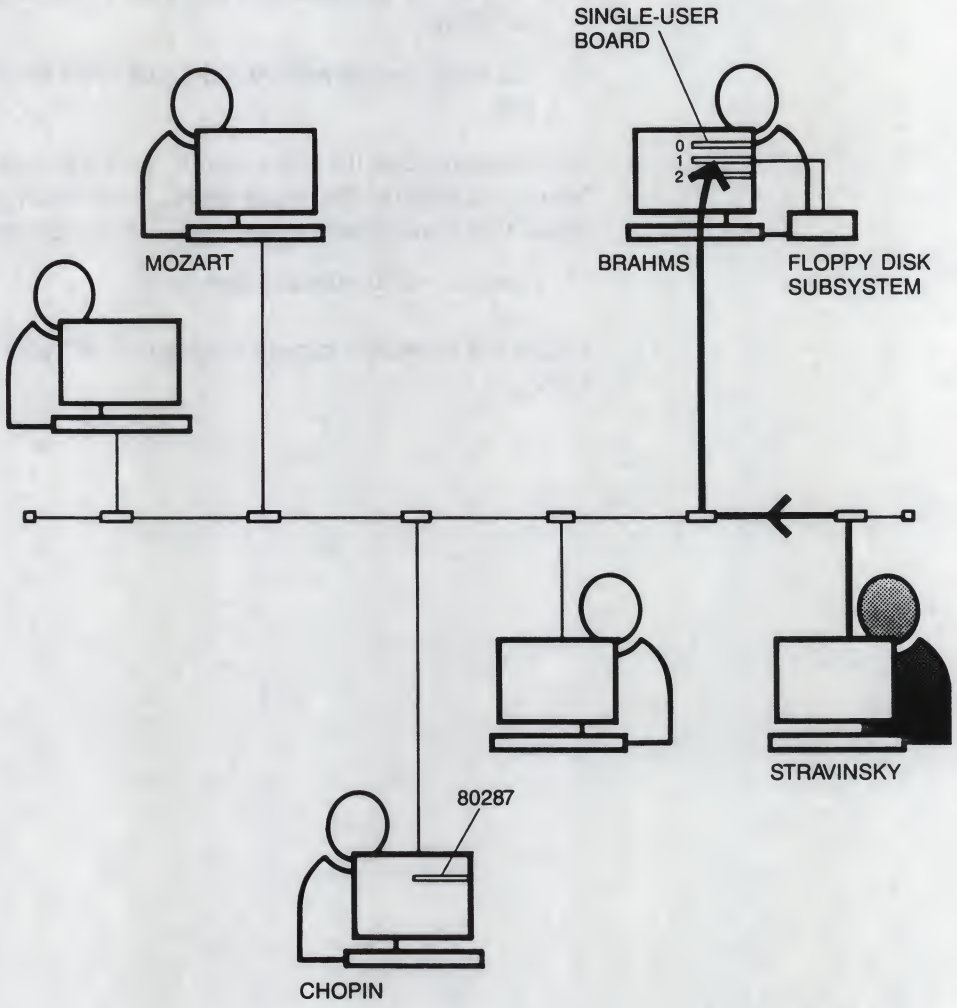
- *nodename*: is the name of the Sun Workstation where the SunIPC boards are installed
- *x* is a number between 0 and 3 that specifies the remote board you want to use.

Let us assume that the user on node `Brahms` has finished using the SunIPC board connected to the floppy drive. Now a user on node `Stravinsky` wants to use that same SunIPC board. This user could type

```
% pctool -d brahms:/dev/pc1
```

Figure 2-8 shows the current distribution of SunIPC boards on our sample network.

Figure 2-8 *Access to One of Multiple Remote SunIPC Boards*



If a SunIPC Board is Unavailable...

You might sometimes be unable to open a SunIPC window, because another user has access to the SunIPC board that you specified or all SunIPC boards on your network are currently in use.

If a SunIPC board (or boards) is unavailable, and if you started SunIPC with a `pctool` command, not a menu, the system console will receive the following system message:

```
SunIPC board(s) busy.
Do you wish to wait? (Y/N) [N] :
```

If you respond by typing `N` (or by pressing the RETURN key), nothing happens; you can try again later. If you respond by typing `Y`, you can use the SunIPC *polling* feature.

You cannot use the polling feature if you started SunIPC from a menu.

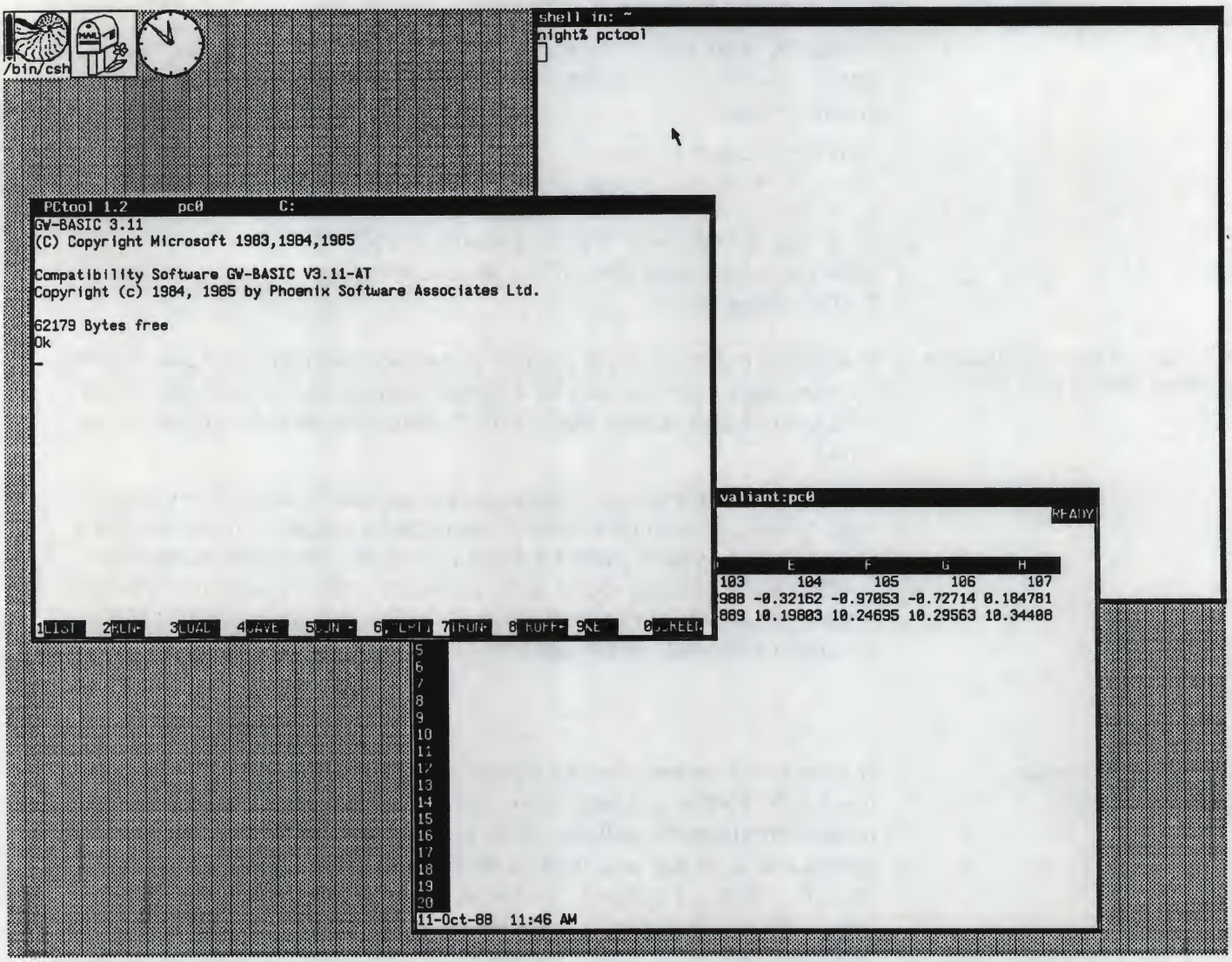
The polling feature allows you to continue working with the other Sun windows on your screen while you wait for a SunIPC board to become available. When a SunIPC board does become free, a SunIPC window automatically opens on your screen.

Activating the polling feature causes system software to check intermittently the SunIPC boards on your network until one becomes available. If you are among several users on your network waiting for access to a SunIPC board, therefore, you will not receive this access in any particular order. So, even if you were the first user to activate the polling feature, the system will not necessarily allocate you the first available SunIPC board.

Working with Multiple SunIPC Windows

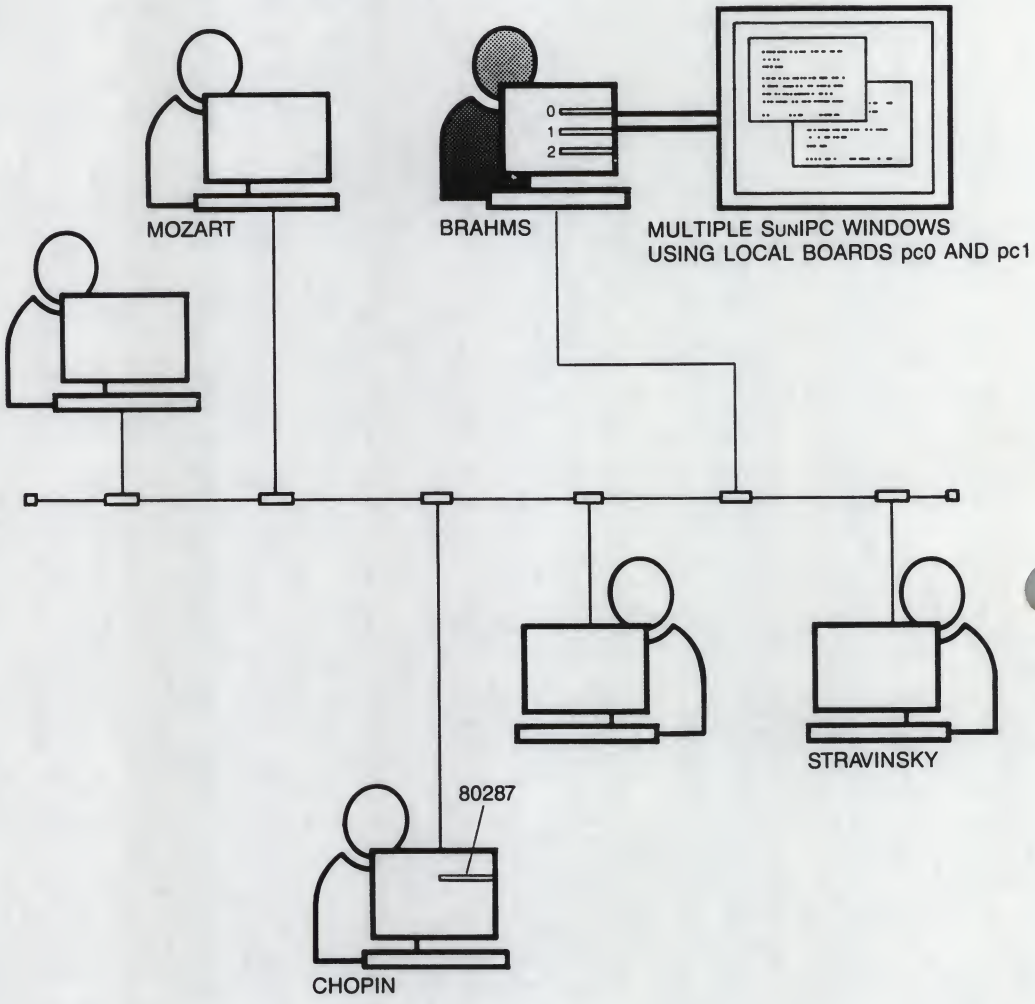
If you want to run two PC applications simultaneously, you can use more than one SunIPC window at a time. You can open multiple SunIPC windows using multiple local boards, multiple remote boards, or a combination of local and remote boards. In any case, think of each window as an independent personal computer. Figure 2-9 shows a Sun Workstation screen with two SunIPC windows. GWBASIC is running in one window, and Lotus 1-2-3 is running in the other window.

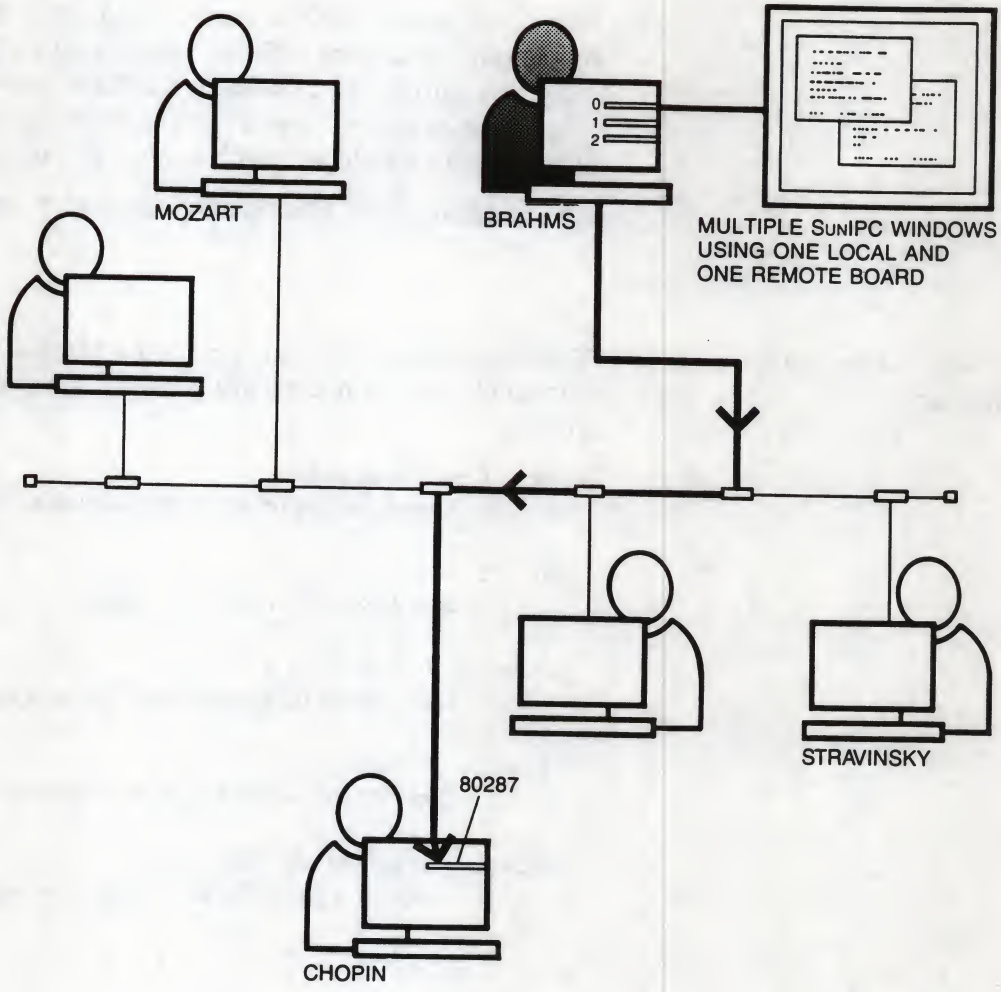
Figure 2-9 *Multiple SunIPC Windows*



Returning to our sample network, a user working at node `Brahms` could open multiple SunIPC windows by using the first (pc0) and second (pc1) SunIPC boards local to that node. As an alternative, the same user could open multiple SunIPC windows by using one local board and one remote board — for example, the first (pc0) board on node `Brahms` and the board on node `Chopin`. Figure 2-10 illustrates both of these options.

Figure 2-10 *Opening Multiple SunIPC Windows*





When you use multiple SunIPC windows, keep the following in mind:

- If you are using a combination of local and remote boards, you might notice some difference in their performance. The operation of a remote SunIPC board can be affected by traffic on your network.

- You can use the `Copy` and `Paste` items on the SunIPC menu to share information between windows.

You can also use the file redirector for fast, direct access to DOS files through the UNIX file system. For more information, see Chapter 6, *Using the File Redirector*.

Files stored on the UNIX file system and accessed through the file redirector or PC-NFS can be shared by different windows. If the files are stored on logical hard disks, they can only be accessed by the SunIPC to which that disk is assigned. Files stored on separate logical hard disks can only be shared between windows by copying the files to an extended, or PC-NFS-mounted, drive follow these steps:

For more information about sharing files with PC-NFS, see the manual *PC-NFS*.

`pctool` Command Line Summary

This section summarizes the `pctool` command lines presented in this chapter. For more `pctool` options that you may find useful, see Chapter 8, *Advanced Topics*.

`pctool -c` *commands*
Automatically executes an application's command file

`pctool -Wi`
Opens a SunIPC window as an icon

`pctool -d /dev/pcx`
Specifies one of multiple local SunIPC boards

`pctool -d` *nodename:*
Specifies any SunIPC board on *nodename:*

`pctool -d` *nodename:*`[/dev/pcx]`
Specifies a particular SunIPC board on *nodename:*

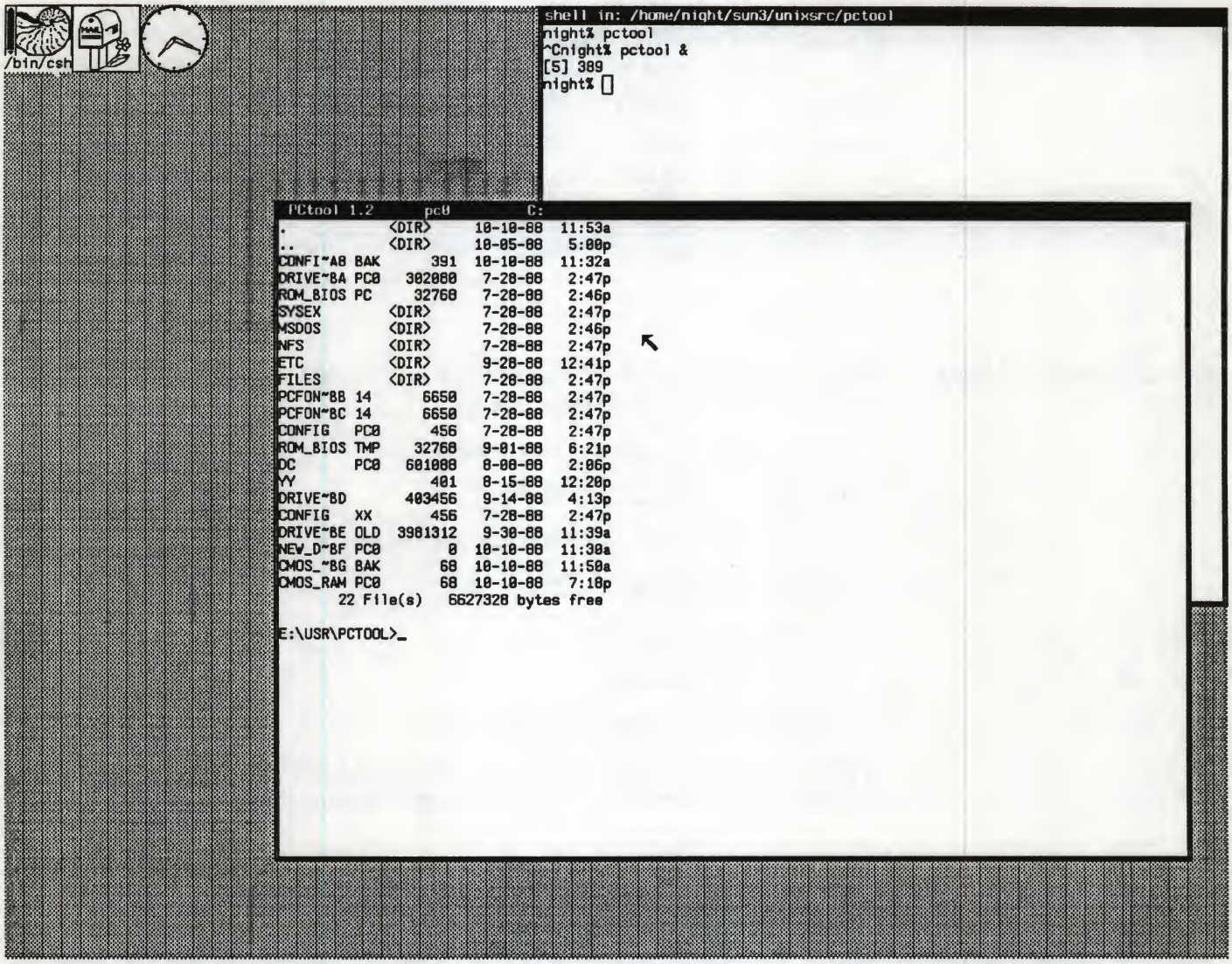
2.2. How is a SunIPC Window Different From Other Sun Windows?

A SunIPC window differs from most other Sun windows in one principal way: You cannot enlarge a SunIPC window to cause it to display more than 25 lines.

You can select the `Resize` item on the frame menu to enlarge a SunIPC window in the usual way. Once you begin entering MS-DOS commands to this larger window, however, you will notice that, although the window takes up more space on your screen, it still displays only 25 lines. This is because a SunIPC window emulates an IBM PC/AT screen, which displays 25 lines.

Figure 2-11 shows you what a SunIPC window looks like when you enlarge it.

Figure 2-11 *Enlarging a SunIPC Window*



Transferring Data to Other Windows

You can cut and copy data directly from a SunIPC window into another window on your Sun Workstation screen.

Assume you are editing a file with `vi` in one window and editing a file with WordStar under SunIPC in another window. You can move a block of text from the `vi` window into the WordStar window. Simply use the `Copy` and `Paste` items on the `Edit` submenu. See the next section for details.

You can also use the file redirector to exchange information between UNIX and DOS working environments. For information about using the redirector, see Chapter 6.

The following sections describe how to work with a SunIPC window.

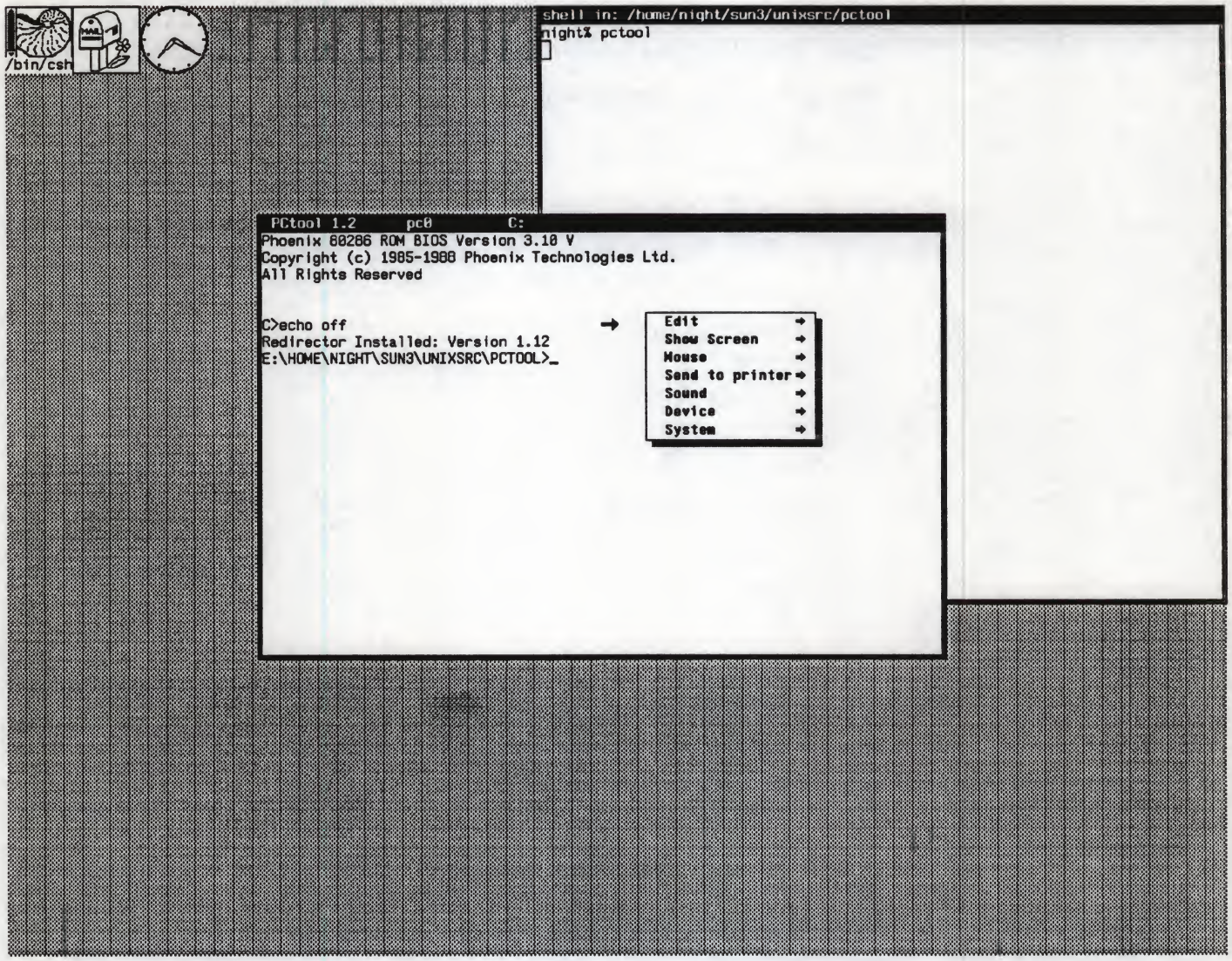
2.3. Selecting SunIPC Menu Items

When you work with a SunIPC window, you can pop up the SunIPC menu at any time. This menu lets you do these things:

- Cut and paste to and from other windows
- Change to another display adaptor
- Use your Sun mouse as a Microsoft bus mouse
- Send data to a printer
- Use the keyboard speaker
- Reset SunIPC hardware
- Control devices connected to the SunIPC

To pop up the SunIPC menu, move the cursor inside a SunIPC window and press the right mouse button. Figure 2-12 shows you what the SunIPC menu looks like.

Figure 2-12 *SunIPC Menu*



The border of the window contains the normal SunView-1 menus. If you are using a Type2 or Type3 keyboard, the normal "accelerator" keys (L1–L10) are only active in the title bar. When the interior of the window is active, L1–L10 are mapped to the IBM PC's F1–F10 keys, so the SunView accelerators are not active. The L keys on Type4 keyboards retain their SunView functions.

The items on the the SunIPC menu include the following:

```
Edit
    Copy
    Paste
    Show Clipboard
        <Contents of Clipboard>
    Copy, then Paste
Show Screen
    Hercules
    CGA
    Monochrome
Mouse
    Sunview
    DOS
Send to printer
    LPT1
    LPT3
Sound
    On
    Off
Device
    Device      Currently       Change To
   *Drive C     Write Enabled   Write Protected
   *Drive D     Write Enabled   Write Protected
   *COM1        Attached        Detached
   *COM2        Attached        Detached
System
    Reboot DOS Window
```

* If these devices are present in your system (as determined by the `config.pcx` file).

The following sections discuss each of the SunIPC menu items and submenus that you can pop up from these items.

Editing

The submenu choices which appear when you choose `Edit` allow you to copy and paste data in a single window or among windows. The `Copy` command creates a copy on the Clipboard of the area you have selected. To insert the copy in another location, choose `Paste`. You can perform both operations at once by choosing `Copy, then Paste`. To view the current contents of the Clipboard, choose `Show Clipboard`.

Changing Display Adaptors

SunIPC emulates three types of display adaptors:

1. IBM AT monochrome adaptor — 80 x 25 characters
2. Hercules monochrome adaptor — 720 x 348 pixels
3. IBM AT color graphics adaptor — 640 x 400 pixels, or 80 x 25 characters

Most PC applications work with both the Hercules adaptor and the color graphics adaptor (CGA). You might decide to set up a PC application to work with only one of these adaptors, however. (You do this when you install the application software.) In addition, some PC applications allow you to select the display adaptor that you want to use each time you run the program.

In any case, you might sometimes need to change display adaptors (or use a different "screen") in order to run a given PC application. You have two ways to do this:

1. Use the MS-DOS `mode` command (if you aren't currently running an application). Note that the `mode` command changes both the screen that you are looking at *and* the screen on which the PC application displays output.
2. Pop up the SunIPC menu and choose `Show Screen`. Then use the `Screen` submenu to select the desired display adaptor. Note that, unlike using the MS-DOS `mode` command, changing display adaptors with the SunIPC menu does *not* change the screen on which the PC application displays output.

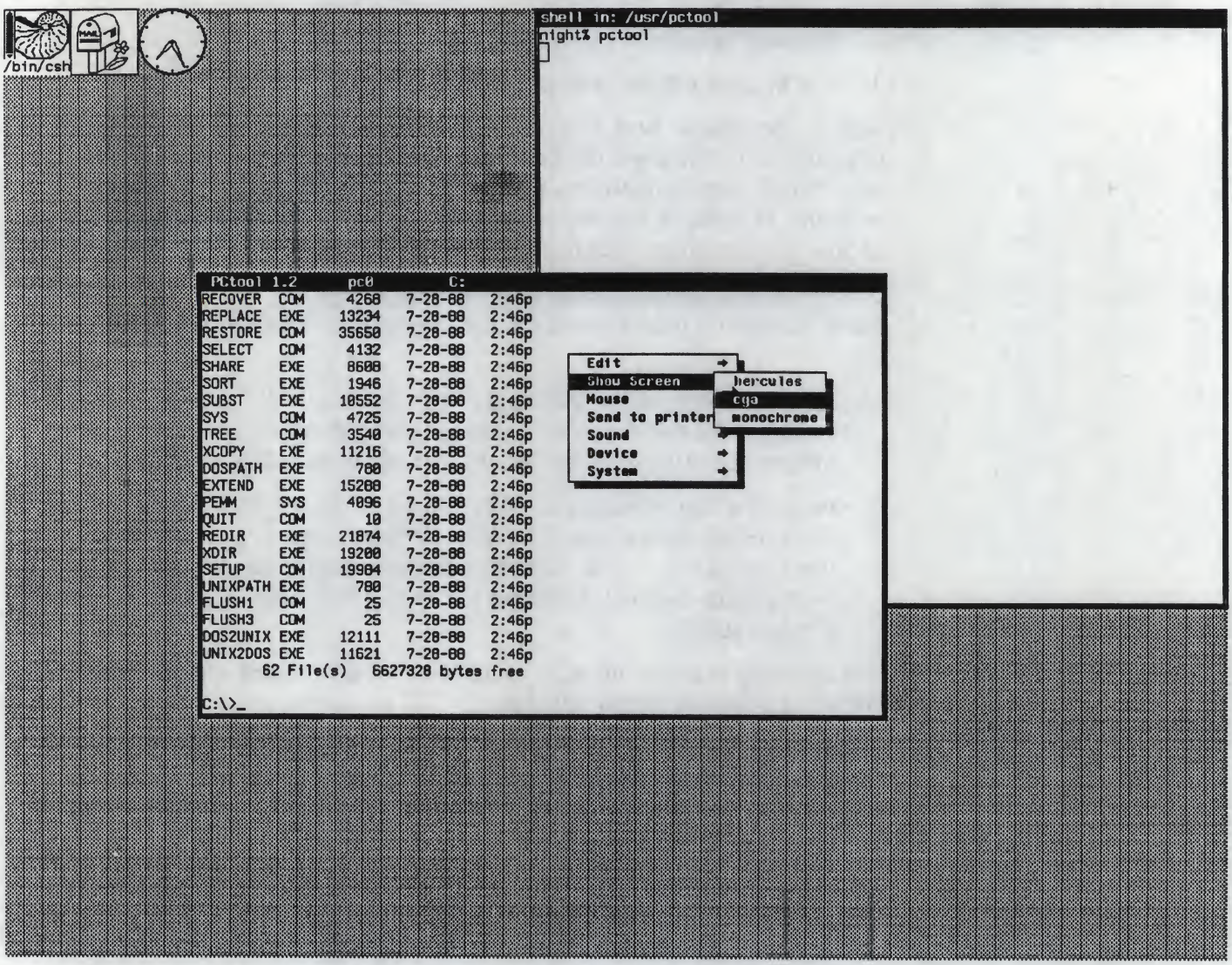
The following examples illustrate using both the SunIPC menu and the `mode` command to change display adaptors:

Assume you open a SunIPC window and begin by running the Flight Simulator program. Before the program begins to run, it prompts you to select certain program options that you want to use. You select `RGB` (Red-Green-Blue), so that you can run Flight Simulator in color.

When you open a SunIPC window, by default, you are working with the Hercules display adaptor. Therefore, in this case, when Flight Simulator begins to run, your screen goes blank. This is because you are looking at the Hercules screen and the application is displaying output on the CGA screen.

To change to the correct display adaptor, pop up the SunIPC menu and use the mouse to move the cursor along the first item, `Screen`. This pops up the `Screen` submenu. Figure 2-13 shows you what this menu looks like.

Figure 2-13 *Screen Submenu*



Now, you select the CGA item. In a few moments, your SunIPC window shows Flight Simulator, already running in color.

When you have finished using Flight Simulator, you can use the `Screen` to change back to the Hercules adaptor. Returning to this adaptor causes your screen to display the MS-DOS prompt and the subsequent commands you enter.

Alternatively, you could have entered the following command line before you ran Flight Simulator:

```
> mode co80
```

As mentioned at the beginning of this section, this command line changes both the screen that you are looking at and the screen where the application displays output. Therefore, if you then run Flight Simulator and select `RGB`, you won't need to change display adaptors.

Now let us assume that you decide to run Flight Simulator again, in black and white this time. Because you are already using the Hercules display adaptor, Flight Simulator displays normal output on your screen as soon as you execute it.

If your SunIPC window is blank when you expect it to contain the PC application you want to run, you are probably using the wrong display adaptor.

If you *are* using the wrong display adaptor, you have not lost any application output. As soon as you change to the correct display adaptor, as in the preceding example, you will see the expected application screen.

For more information about the MS-DOS `mode` command, see the *DOS User's Manual*.

Attaching and Detaching the Mouse

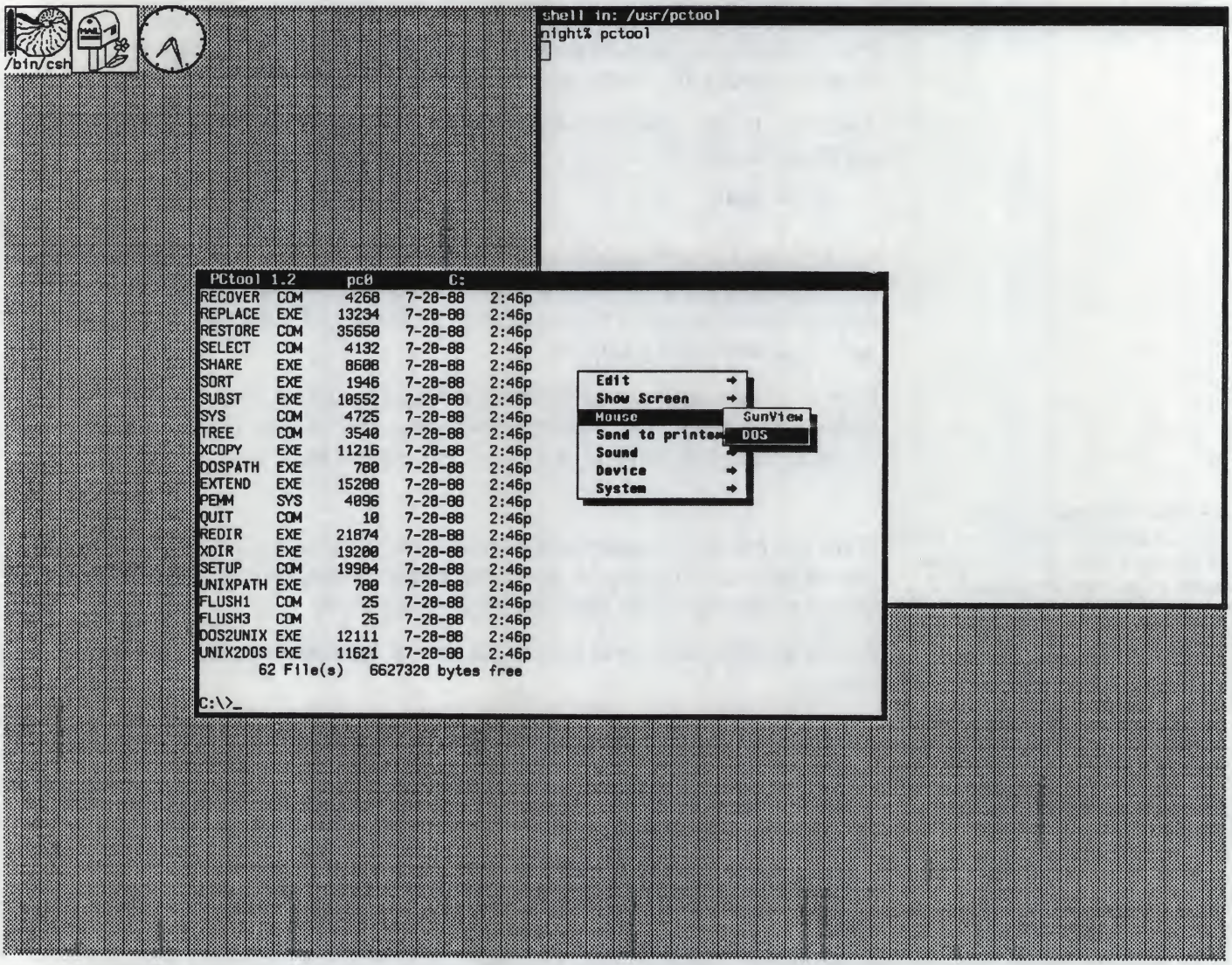
When you choose the `DOS` item on the `Mouse` submenu, you cause the mouse to emulate a Microsoft bus mouse. You can then use this PC mouse with the PC applications you run in a SunIPC window. When you choose `SunView` , the PC mouse becomes a Sun mouse again and you can use it with your other Sun windows.

Before you use the PC mouse with your application programs, read the section *Using the Microsoft Mouse Driver* in Chapter 5. That section contains important information about the Microsoft mouse driver program that you must install before running some PC applications.

If you want to use the mouse with a PC application, remember to attach the mouse *before* executing the application program.

To attach the mouse, pop up the SunIPC menu by pressing the right mouse button and then use the mouse to move the cursor along the third item, `Mouse`. This pops up the `Mouse` submenu. Figure 2-14 shows you what this menu looks like.

Figure 2-14 *Mouse Submenu*



Now select the `DOS` item. Once you select this item, your Sun mouse functions as a PC mouse until you pop up the `Mouse` submenu again and select the `SunView` item.

Using Mouse Buttons

The Microsoft PC mouse has two buttons; the Sun Mouse has three buttons. When you use your Sun mouse as a PC mouse, the left and center Sun Mouse buttons correspond to the left and right Microsoft PC mouse buttons, respectively. The right button on your Sun mouse is thus always available for popping up the SunIPC menu.

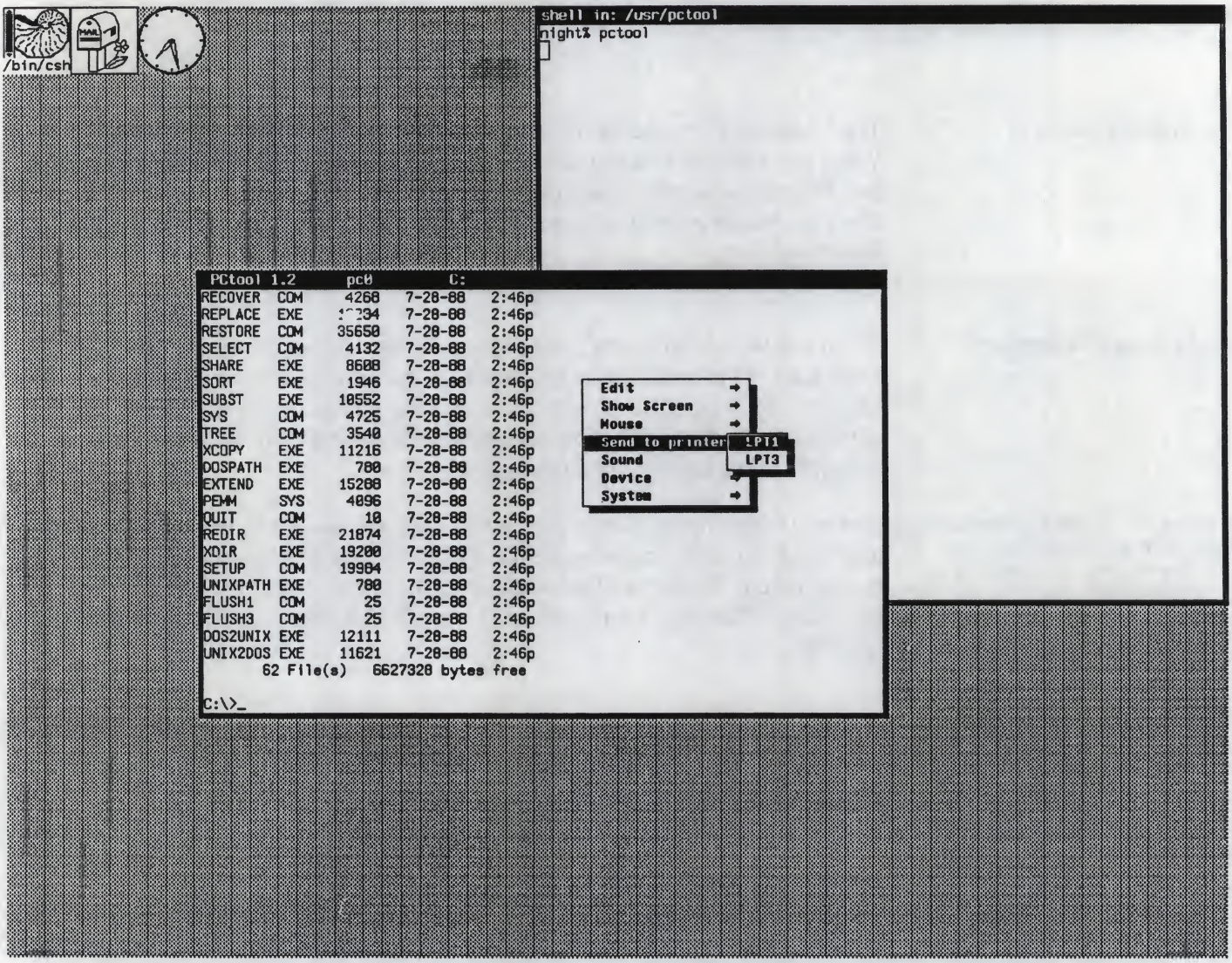
Sending Data to a Printer

When you work with SunIPC, you can use the MS-DOS logical device names LPT1, LPT2, and LPT3 to send data to different physical printers on your network. Chapter 5 fully describes how to associate these logical device names with their physical counterparts. Chapter 5 also describes at what point SunIPC sends your print jobs to the appropriate printer queue.

The `Send to printer` item does not work with printers that you set up with the PC-NFS `net use` and `net print` commands.

One way to enter your SunIPC print job in a printer queue is to pop up the SunIPC menu by moving the cursor inside the SunIPC window and pressing the right mouse button. Then move the cursor along the fourth item, `Send to printer`. This pops up a submenu. Figure 2-15 shows you what this menu looks like.

Figure 2-15 *Printer Submenu*



You can now select either the `LPT1` or the `LPT3` item to hasten your most recent print job to the physical printer associated with that logical device name.

If you have sent information to the network printer, it will not enter the print queue until one of the following events occurs:

1. One minute elapses.
2. You quit the SunIPC.
3. You choose `Send to printer` from the menu.

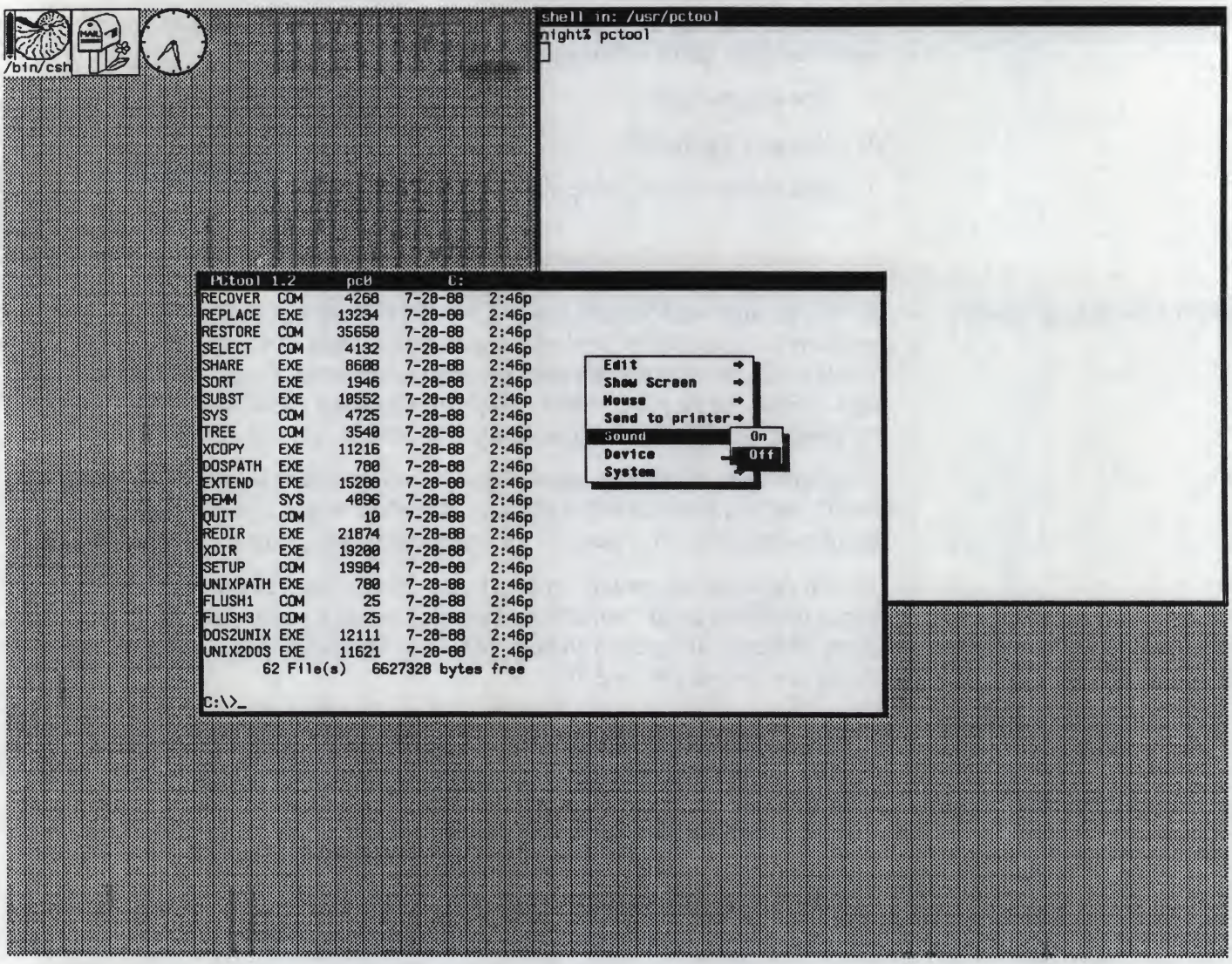
Using the Keyboard Speaker

When you work with SunIPC, you can turn the *keyboard speaker* on or off. When you turn it on, the SunIPC keyboard speaker emits tones of a single frequency. The SunIPC keyboard speaker does *not* emulate the music played by some PC applications. Its purpose, rather, is to provide an audio signal that notifies you of, for example, an invalid character that you entered in some data field.

When you open a SunIPC window, the keyboard speaker is automatically turned on. If you decide to run a PC application that plays music, however, turn the keyboard speaker off. This prevents the speaker from producing a series of beeps.

To turn the keyboard speaker on or off, pop up the SunIPC menu by moving the cursor inside the SunIPC window and pressing the right mouse button. Then, move the cursor along the fifth item, `Sound`. This pops up the `Speaker` submenu, as shown in Figure 2-16 .

Figure 2-16 *Speaker Submenu*



Select either the `on` or the `off` item.

If a SunIPC Window Does Not Respond...

If a SunIPC window does not respond to your input, try entering any application-specific key sequences that might get things moving again. If your SunIPC window is still frozen, you can reset the SunIPC hardware. To do this, pop up the SunIPC menu and choose `Reboot DOS Window` from the `System` submenu. If you have a SunIPC floppy disk subsystem, be sure that the drive door(s) are open while you are resetting the hardware.

Resetting the SunIPC hardware is equivalent to rebooting a PC. As a result, certain default settings for the SunIPC window take effect. (For example, the display adaptor is reset to the setting in effect when you first booted.)

Controlling Devices

The options on the `Device` submenu allow you to change the write protection status of all devices attached to the system. They allow you to detach and re-attach devices as well.

Quitting a SunIPC Window

To quit a SunIPC window, pop up the `frame menu` by moving the cursor to the SunIPC window border and pressing the right mouse button. Select and confirm the `Quit` item.

You can also quit by simply typing the `quit` command:

```
> quit
```

Now that you have learned how to open a SunIPC window and select SunIPC menu items, you can go on to the next chapter. Chapter 3 describes using a Sun Workstation keyboard to work with a SunIPC window.

3

Using Your Keyboard with SunIPC

Using Your Keyboard with SunIPC **59**

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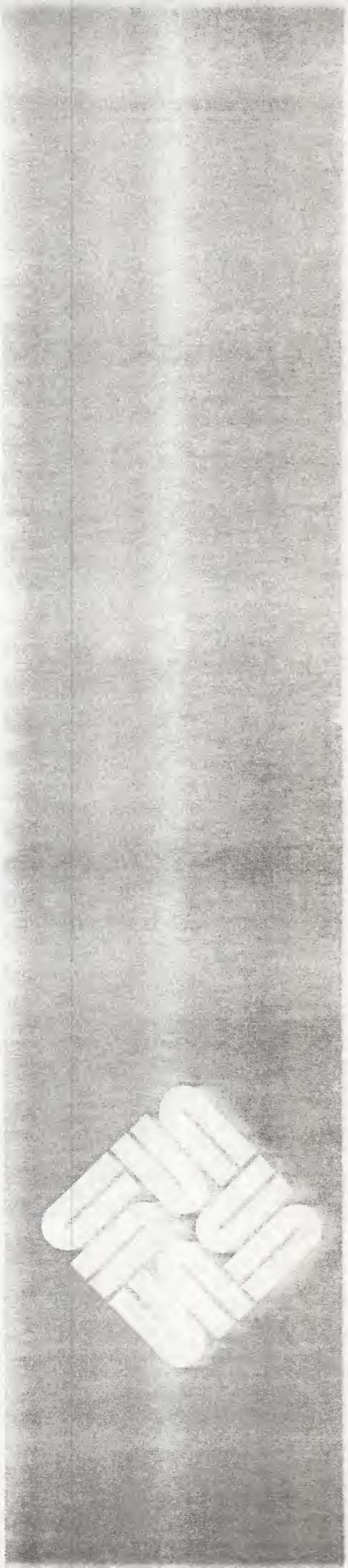


3

Using Your Keyboard with SunIPC

When you work with a SunIPC window, you use your Sun Workstation keyboard in place of an IBM PC/AT keyboard. This chapter describes the one-to-one key correspondence, or *mapping*, between IBM PC/AT keyboards and Sun Type2, Type3, and Type4 keyboards.

This chapter also discusses the following special keyboard features:

- SunIPC keyboard template
- Repeating keys

3.1. Mapping SunIPC to a Type2 Keyboard

Compare the keyboard layouts in the following figures. Figure 3-1 shows the keyboard of an IBM PC/AT. Figure 3-2 shows the Type2 keyboard. Each keyboard is divided into three separate keypads:

1. Left keypad
2. Main (middle) keypad
3. Right keypad

Figure 3-1 *IBM PC/AT Keyboard*

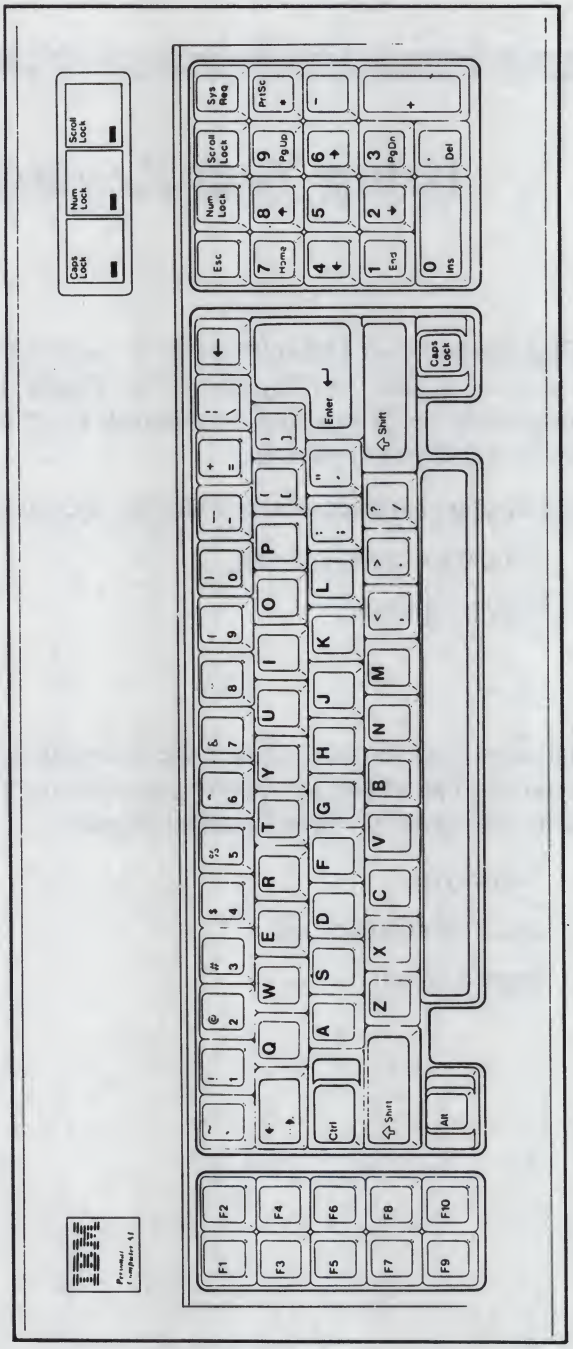
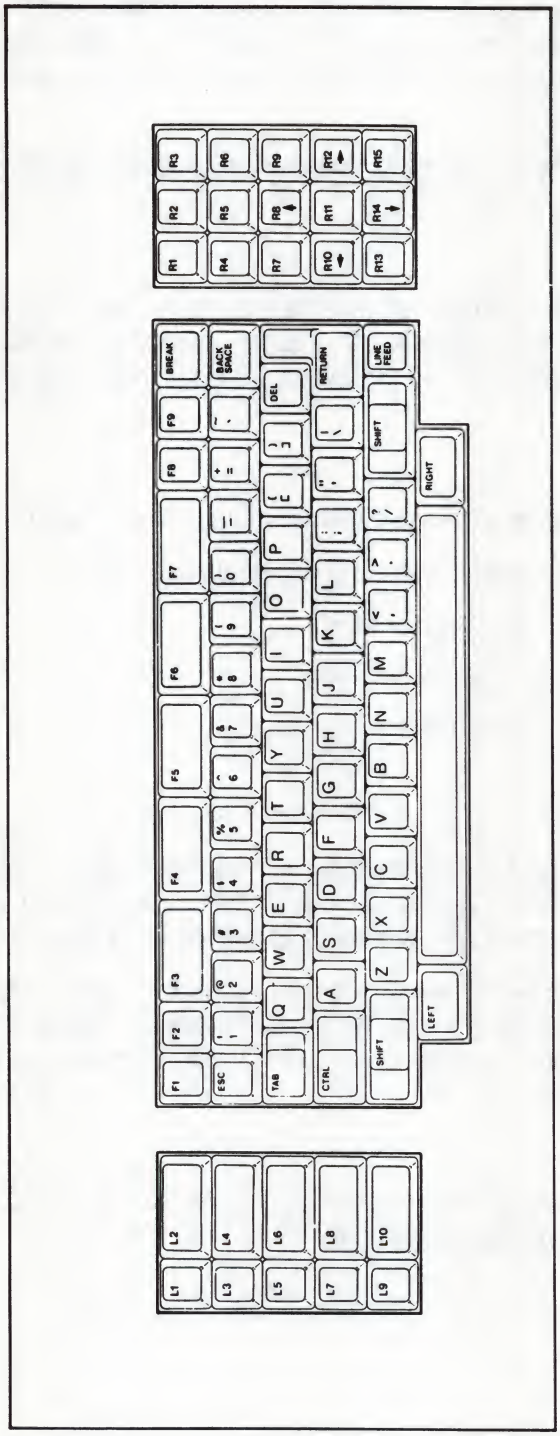


Figure 3-2 *Type2 Keyboard*



As you can see, although the basic keyboard layouts are similar, there are differences in the placement and number of special keys and function keys. For the purposes of this discussion, *special keys* are the alphabetically-labeled keys on the main keypad (for example, the TAB key). *Function keys* have a two-character label: one alphabetic character and one numeric character (for example, F3). Function keys are located on the left and right keypads and above the main keypad.

The following sections address each keypad separately.

Left Keypad

The ten function keys on the left keypad of the Type2 keyboard correspond directly to the left keypad keys on the IBM PC/AT. Thus, F1 on the IBM PC/AT maps to L1 on the Type2, F2 maps to L2, and so on.

Main Keypad

The main keypad includes four different key groupings:

- Alphanumeric and special characters
- Left special keys
- Right special keys
- Function keys

Alphanumeric and Special Characters

You will find all of the alphanumeric and special character keys on the IBM PC/AT on the Type2 keyboard. Two keys, however, do not occupy the same positions on the Type2 keyboard as they do on the IBM PC/AT.

IBM PC/AT key #1 (special characters ~ and ‘) appears at the end of the special character row on the Type2 keyboard. IBM PC/AT key #14 (special characters | and \) appears at the end of the A–L row on the Type2 keyboard.

Left Special Keys

Table 3-1 shows the mapping for the left special keys on the IBM PC/AT and the Type2 main keypads.

Table 3-1 *Left Special Key Mapping*

IBM PCAT key	Type2 key
TAB (arrows)	TAB
Ctrl	CTRL
Shift	SHIFT
Alt	LEFT or RIGHT

The [Esc] key on the IBM PC/AT right keypad maps to the [ESC] key at the top left of the Type2 special keys.

Right Special Keys

Table 3-2 shows the key mapping for the right special keys on the IBM PC/AT and the Type2 main keypads.

Table 3-2 *Right Special Key Mapping*

IBM PCAT key	Type2 key
Back Space	BACK SPACE or DEL
Enter	RETURN
SHIFT	SHIFT
CAPS LOCK	LINE FEED

Top Function Keys

The Type2 function keys F1–F7 and the [BREAK] key in the top row of the main keypad have no corresponding keys on the IBM PC/AT. Pressing any of these Type2 keys does not affect a SunIPC window.

Table 3-3 shows the mapping for the function keys on the IBM PC/AT and Type2 main keypads.

Table 3-3 *Function Key Mapping*

IBM PCAT key	Type2 key
Num Lock	F8
Scroll Lock	F9

Right Keypad

Each key on the right keypad of the IBM PC/AT maps to a key on the right keypad of the Type2 keyboard, except the Num Lock , Scroll Lock , and Esc keys. The Num Lock and Scroll Lock keys map to Type2 main keypad function keys, and the Esc key maps to a Type2 left special key (see preceding sections). Note that the positions of the rest of the right keypad keys vary between the two keyboards.

Table 3-4 shows the mapping for the right keypad function keys on the IBM PC/AT and Type2 keyboards.

Table 3-4 *Right Keypad Mapping*

IBM PCAT key	Type2 key
Esc	ESC
Num Lock	F8
Scroll Lock	F9
Sys	R1
7	R7
8	R8
9	R9
*	R2
4	R10
5	R11
6	R12
-	R3
1	R13
2	R14
3	R15
+	R6
Ins	R4
Del	R5

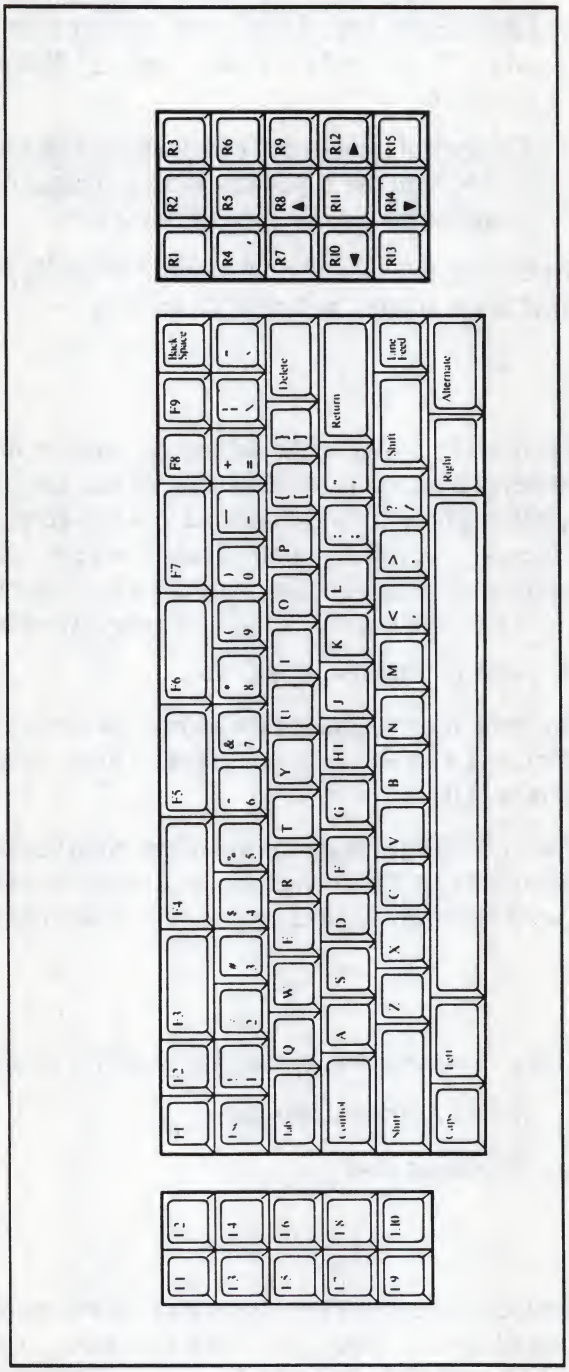
3.2. Mapping SunIPC to a Type3 Keyboard

The preceding section described key mapping between the IBM PC/AT and Type2 keyboards. The Type3 keyboard is a *superset* of the Type2 keyboard.

Take a few moments to examine Figure 3-3 , which shows the Type3 keyboard. You will notice that the Type3 keyboard has two special keys that do not appear on the Type2 keyboard: the Caps key and the Alternate key. Both of these keys are found at the bottom of the main keypad, on the left and right sides, respectively.

Neither the Caps nor the Alternate performs the same function as the Alt key on the IBM PC/AT keyboard. The Caps key does not correspond to any key on the PC/AT keyboard; pressing it does not affect a SunIPC window.

Figure 3-3 *Type3 Keyboard*



Two other keys on the Type3 keyboard differ from the Type2 keyboard keys.

- The [BREAK] key on the Type2 keyboard (at the right of the main keypad function keys) does not appear on the Type3 keyboard. In its place is the [BackSpace] key. This Type3 key corresponds to the [BACKSPACE] key on the Type2 keyboard and to the [←] (Backspace) key on the IBM PC/AT keyboard.
- The special symbol key containing the characters | and \ that appears in the A–L row on the Type2 keyboard is located on the right side of the special character row on the Type3 keyboard.

The keys on the left and right keypads of the Type3 keyboard map to the IBM PC/AT keyboard just as the Type2 keys do.

3.3. Using the Type4 Keyboard

If you have a Type4 keyboard, the functions of the keys closely match those of the keys on an IBM PC/AT keyboard. If you are using a Type4 keyboard under SunOS Version 4.0, it is important that you enter the `pctool` command with the `-force_type4kb` option. This option provides IBM PC/AT keyboard functionality, including emulation of the `Caps Lock`, `Num Lock`, and `Scroll Lock` LEDs in the title bar of the SunIPC window. Enter the command this way:

```
% pctool -force_type4kb
```

For more information, see the section on `pctool` options in Chapter 8. This command may no longer be necessary under operating systems later than SunOS Version 4.0.

The F1–F10 keys along the top of the main keypad map to the ten IBM PC/AT function keys. This correspondence allows the keys in the left keypad on the Type4 keyboard to function just as they do in SunView.

3.4. Special Keyboard Features

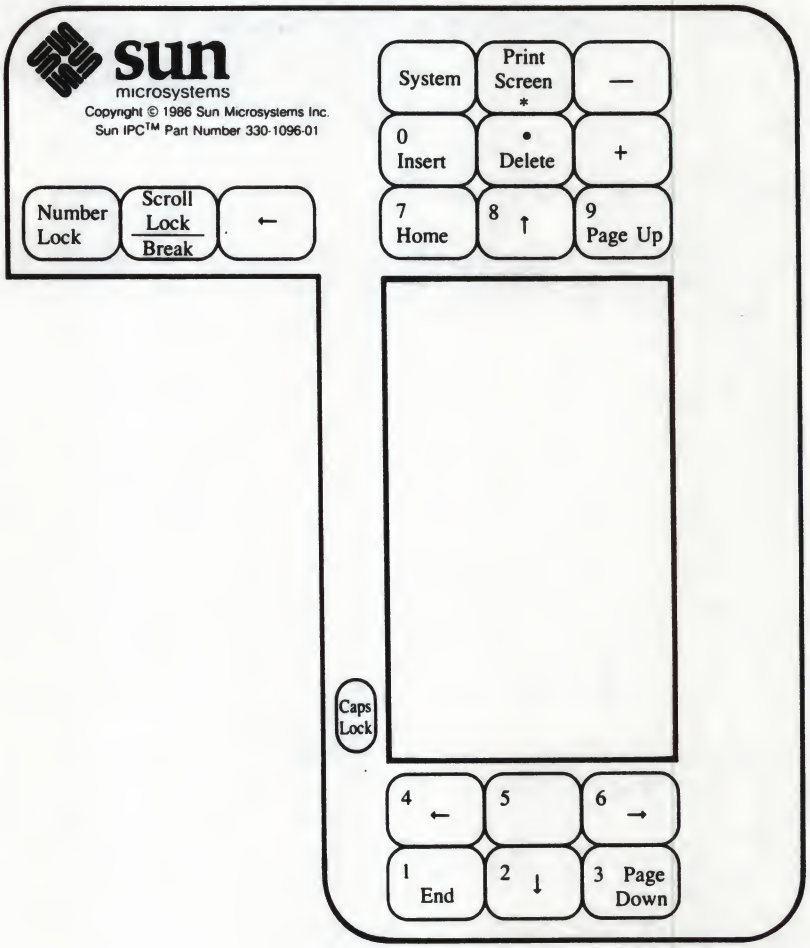
This section describes special keyboard features available with SunIPC:

- SunIPC keyboard template
- Repeating keys

SunIPC Keyboard Template

SunIPC documentation includes a keyboard template that fits over the numeric keypad keys of Type2 and Type3 keyboards. You can use this template to remind yourself of the mapping between the IBM PC/AT and Sun Workstation keyboard keys. Figure 3-4 shows you what the SunIPC keyboard template looks like.

Figure 3-4 *SunIPC Keyboard Template*



Repeating Keys

When you press and hold down a *repeating key*, it prints a character or performs a function continuously until you release it. All keys repeat on Sun Workstation keyboards, just as they do on the IBM PC/AT keyboard.

Now that you have learned how to use your keyboard to work with SunIPC, you may want to continue with Chapter 4, *Using Disks*.

4

Using Disks

Using Disks 71

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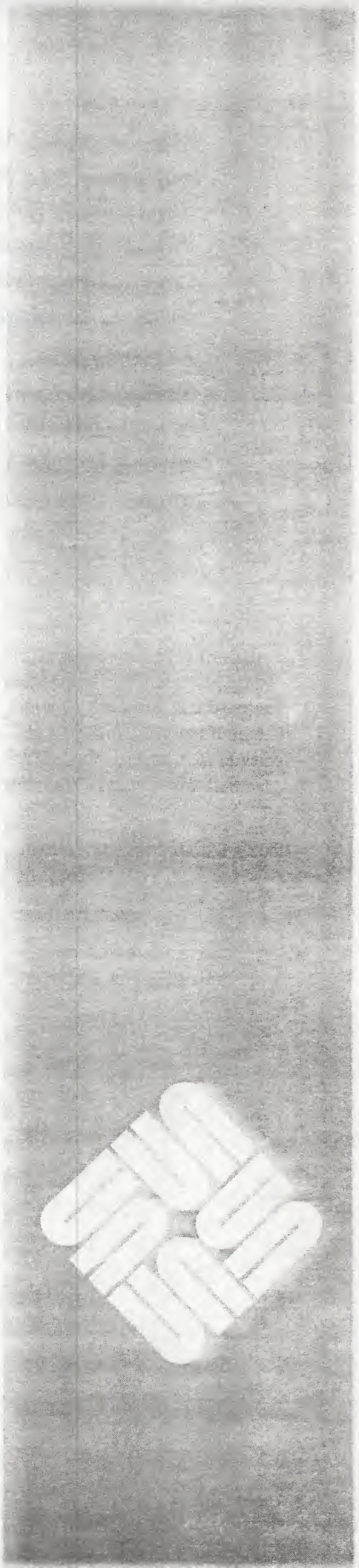

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4

Using Disks

This chapter discusses how to use floppy disks and a SunIPC logical hard disk when working with a SunIPC window. You can use these two types of disks to store and retrieve your SunIPC files.

This chapter contains the following sections:

- *Using a SunIPC Floppy Disk Drive* — Summarizes the uses of both versions of the optional SunIPC floppy disk subsystem and presents special considerations for working with floppy disks.
- *Using a SunIPC Logical Hard Disk* — Summarizes the uses of SunIPC logical hard disks. This section also discusses creating a board-independent `autoexec.bat` file, as well as installing PC applications. The powerful file redirector, which permits direct access to the UNIX file system, is also described. Finally, this section tells how to use drives E–Z to work with NFS files, and how to edit a SunIPC configuration file to change the size or location of a logical hard disk.

This chapter does not contain many MS-DOS command examples; you can find many such examples in the *DOS User's Manual*. Instead, this chapter offers guidelines and recommendations for working with I/O devices within the context of SunIPC.

4.1. Using a SunIPC Floppy Disk Subsystem

The following sections contain guidelines for using a SunIPC floppy disk subsystem. These guidelines include the following:

- When to use 1.2 Mbyte or 360 Kbyte floppy disks
- Which floppy disk subsystem to use if you are using a remote SunIPC board
- What to do if you are using a SunIPC board that does not have a floppy disk subsystem
- How to work with SunIPC single- and dual-drive floppy disk subsystems

Why Use a Floppy Disk?

When you work with a SunIPC window, you can use a floppy disk to do any of the following:

- Install PC applications onto a SunIPC logical hard disk or an NFS server's disk.
- Run PC applications whose copy protection schemes do not allow you to install them on the SunIPC logical hard disk. For more information about logical hard disk installation procedures, see the section *Installing PC Applications*.
- Run PC applications that use a key disk copy protection scheme, as described in the section *Installing PC Applications*.
- Transport your SunIPC files to another PC.
- Load DOS files onto the UNIX file system and access them with the file redirector.

1.2 Mbyte vs. 360 Kbyte

You can use the SunIPC *single-drive* floppy disk subsystem to perform both read and write operations on 1.2 Mbyte floppy disks. You should only perform read operations on 360 Kbyte floppy disks, however. Just as would be the case with an IBM PC/AT, if you use a 1.2 Mbyte drive to write to a 360 Kbyte floppy, you may not be able to read that floppy in a 360 Kbyte drive.

You can use the SunIPC *dual-drive* floppy disk subsystem to perform both read and write operations on both 1.2 Mbyte and 360 Kbyte floppy disks. When you use the top drive (drive A), you can perform both read and write operations on 1.2 Mbyte floppy disks and read operations on 360 Kbyte floppy disks. When you use the bottom drive (drive B), you can perform both read and write operations on 360 Kbyte floppy disks.

If you are not sure whether a given floppy disk is 1.2 Mbyte or 360 Kbyte, you can use the MS-DOS `chkdsk` command. Entering this command displays statistics about the amount of available and occupied space on the disk. (Remember to insert the floppy disk in drive A. You cannot use drive B to perform read operations on a 1.2 Mbyte floppy disk.)

Which Floppy Disk Subsystem Should I Use?

A SunIPC floppy disk subsystem can be connected to and is associated with only one SunIPC board at a time. If you are using a local SunIPC board, you use a local floppy disk subsystem.

If Your SunIPC Board Does Not Have a Floppy Disk Unit...

As described in Chapter 1, *Introducing SunIPC*, the floppy disk subsystem is an optional SunIPC hardware feature. Therefore, you might have access to a SunIPC board that does not have an attached floppy disk unit. In this case, you have two options:

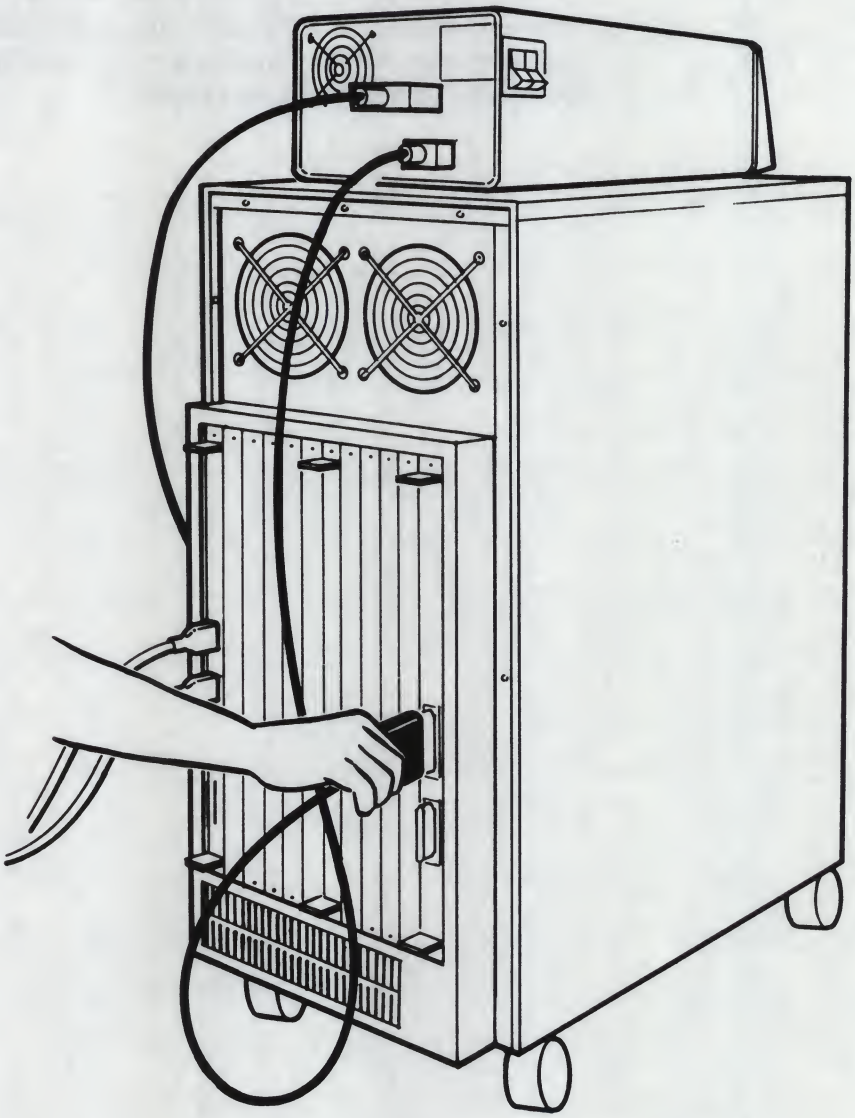
- You can borrow a floppy disk subsystem from another SunIPC board on your network and connect the borrowed unit to the SunIPC board that you are

using.

- You can work without one.

Figure 4-1 shows you how to connect a borrowed floppy disk subsystem to a SunIPC board. Before you connect the borrowed floppy unit, however, you must power down the Sun Workstation in which the SunIPC board is installed. If you expect to borrow floppy units frequently, therefore, it is recommended that you buy your own floppy disk subsystem.

Figure 4-1 *Connecting a SunIPC Floppy Disk Drive*



If borrowing a SunIPC floppy disk subsystem is not feasible *and* if your PC applications' copy protection schemes permit this type of hard disk installation, you can store applications and data files on a SunIPC logical hard disk or a network server's disk. For recommendations on installing PC applications, see the section *Installing PC Applications*.

Note that a SunIPC board without a floppy disk subsystem is not a closed system. Because you have UNIX file access, you can transfer files between a SunIPC logical hard disk and a network server's disk.

For further information about UNIX file access, see Chapters 6 and 7.

If You are Using a Remote SunIPC Board...

If you are using a remote SunIPC board, remember to use the remote floppy disk subsystem that is connected to the remote board you are using. (As described in Chapter 1, your system manager should give you a list of the available SunIPC boards on your network and their locations.)

If there is another user at the Sun system where this remote SunIPC board resides, it might not be convenient for you to use the associated remote floppy disk drive(s). For example, a meeting may be in progress in the room that contains this Sun system. Your system manager should coordinate the installation of SunIPC boards and floppy disk subsystems to minimize these conflicts.

Referencing Disk Drives A and B

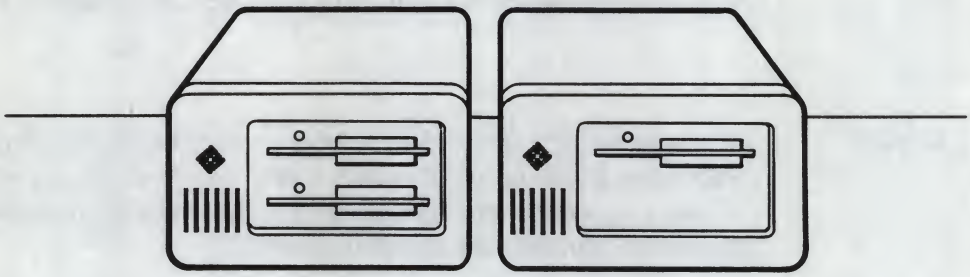
If you are working with a single-drive floppy unit, by default you refer to this drive as drive A. However, you can use the MS-DOS `assign` command to change SunIPC drive assignments. You might want to do this if, for example, you plan to run a PC application that requires you to store data files on drive B.

The section *Changing Default Drive Assignments* shows you how to use the `assign` command. For further examples, see the *DOS User's Manual*.

If you are working with a dual-drive floppy unit, by default, you refer to the disk drive on top as drive A and the disk drive on the bottom as drive B.

Figure 4-2 shows both the single- and dual-drive floppy disk subsystems that you can use with SunIPC.

Figure 4-2 *SunIPC Floppy Disk Drives*



About Single-Drive Floppy Disk Operations

If you are using a single-drive floppy disk subsystem, when you use floppy disks with SunIPC, you must follow the MS-DOS command procedures for single-drive PCs. This means that you need to "shuffle the floppies."

MS-DOS commands that let you use single-drive procedures include the following:

- The `diskcopy` command to make a copy of a floppy disk

- The `diskcomp` command to compare two floppy disks

For instructions on performing these single-drive floppy disk operations, see the *DOS User's Manual*.

About Dual-Drive Floppy Disk Operations

If you are using a dual-drive floppy disk subsystem, when you use floppy disks with SunIPC, you can follow all MS-DOS command procedures for dual-drive PCs. These procedures are described in the *DOS User's Manual*.

Cleaning the Floppy Disk Subsystem

It is recommended that you clean the floppy disk subsystem once a month with Perfect Data part #FD-05 or an equivalent head-cleaning unit.

4.2. Using a SunIPC Logical Hard Disk

As many as two logical hard disks (drives C and D) are associated with each SunIPC board. Therefore, if you store PC applications or data files on a logical hard disk, these programs and files are available to you whenever you use the SunIPC board associated with that logical hard disk. A SunIPC logical hard disk thus provides the same convenient and permanent file storage as a PC's physical hard disk. By default, you can gain access to the SunIPC logical hard disk through drive C.

The following sections contain guidelines for using the logical hard disk associated with a SunIPC board. The guidelines include these:

- How a logical hard disk differs from a physical hard disk
- How to use a board-independent `autoexec.bat` file to set parameters for any SunIPC session, regardless of which SunIPC board you are using
- How best to install PC applications
- How to reference disk drives C–Z
- How to change the size of a SunIPC logical hard disk
- How to change the location of a SunIPC logical hard disk

Why Use a Logical Hard Disk?

When you work with a SunIPC window, you can use an associated logical hard disk to do the following:

- Allow your PC files to be backed up automatically during UNIX backup of the Sun system disk on which the logical hard disk resides.
- Supplement or eliminate your use of a SunIPC floppy disk subsystem.
- Make specific files available each time you use a particular SunIPC board.

- Maintain PC files for use by a group of users who have shared access to a SunIPC board.
- Store a board-dependent `autoexec.bat` file to set parameters for each of your sessions with a particular SunIPC board.

When you use SunIPC, some special considerations arise because you are using a logical, not a physical, hard disk. The following sections discuss these considerations.

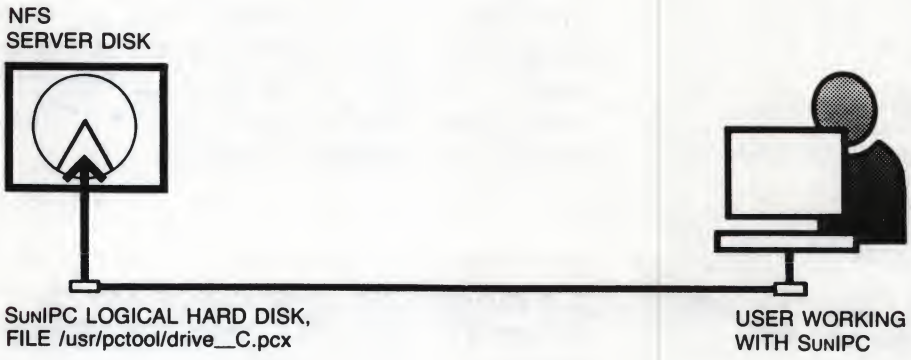
About Hard Disk Emulation

When you work with a SunIPC window, your PC files appear to be stored on a physical hard disk. For example, if you enter the MS-DOS `dir` command as shown in Figure 4-5 , the resulting display includes the remaining bytes of free disk storage space.

In reality, this "hard disk" is an emulated, or logical, hard disk. SunIPC thus maintains your PC files in a large file called `drive_C.pc`*x* that is stored in the UNIX file system of the Sun Workstation in which the SunIPC board is installed. (*x* is a number between 0 and 3 that refers to a specific SunIPC board. These numbers are determined by your system manager during the installation of the SunIPC board.) For this reason, your SunIPC files are automatically included in network and PC-NFS server backup operations.

Figure 4-3 illustrates how your SunIPC files might actually be stored on a network.

Figure 4-3 *The SunIPC Logical Hard Disk*



The `autoexec.bat` File

If you have worked with a PC, you may be familiar with the uses of the `autoexec.bat` file. This file is created by MS-DOS users and maintained on the PC's hard disk. Each time MS-DOS starts up ("boots"), it automatically executes this startup file. When you use a SunIPC, you can create and maintain a similar `autoexec.bat` file on the associated logical hard disk, drive C. This is a *board-dependent* `autoexec.bat` file, because it is associated with one and only one SunIPC.

Limitations of Board-dependent `autoexec.bat` Files

When you share access to a SunIPC board with other users, using a board-dependent `autoexec.bat` file may cause problems. When you open a SunIPC window using a remote SunIPC board, MS-DOS executes the associated remote `autoexec.bat` file. This remote startup file might not reflect the way you want to set up the SunIPC for your use. In addition, if you have shared access to more than one SunIPC board on your network, there can be very different `autoexec.bat` files for each SunIPC board that you use. If this is the case, then each SunIPC board presents a different environment. The next section explains how to avoid this problem.

Creating a Board-independent `autoexec.bat` File

The redirector maps direct access to the UNIX file system. It does so by way of the standard `autoexec.bat` file, which runs whenever SunIPC loads. You can also establish consistent access to a single `autoexec.bat` file by creating and maintaining a second *board-independent* `autoexec.bat` file in your current UNIX directory. The board-dependent `autoexec.bat` file executes the board-independent `autoexec.bat` file in the UNIX directory. This `autoexec.bat` file then performs the necessary MS-DOS and PC-NFS commands to set up the SunIPC for your use.

To summarize:

- The board-dependent `autoexec.bat` file is associated with a specific SunIPC and is executed whenever that SunIPC is used.
- The board-independent `autoexec.bat` file is associated with a specific user, and is executed *after* the board-dependent file, whenever that user uses the SunIPC.

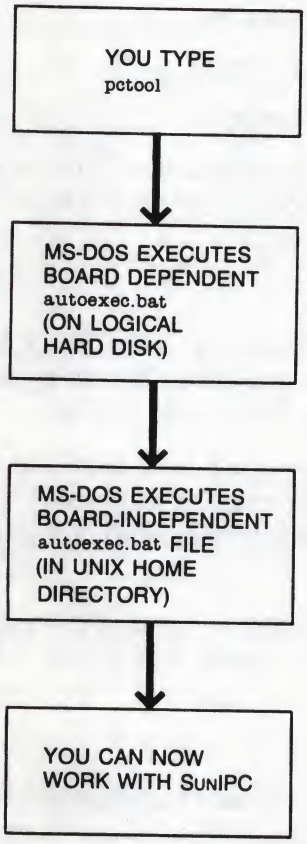
The following sections give you a brief overview of why and how you might use a board-independent `autoexec.bat` file. If you want to create one of your own, you can find information about accessing the UNIX file system in Chapters 6 and 7 of this manual and in the manual *PC-NFS*.

The standard `autoexec.bat` file looks like this:

```
echo off
prompt $p$g
redir
extend e:=$CD h:$HOME n:/usr/pctool r: \
path c:\;h:\pc;n:\msdos
e:
if exist e:autoexec.bat e:autoexec.bat
if exist e:autoexec.bat goto done
if exist h:\pc\autoexec.bat h:\pc\autoexec.bat
:done
```

Figure 4-4 illustrates the result when MS-DOS executes the board-dependent and board-independent `autoexec.bat` files associated with a SunIPC board.

Figure 4-4 *How MS-DOS Executes* `autoexec.bat` *Files*



Why Use a Board-independent File?

A board-independent `autoexec.bat` file has many uses. For example, you can use this startup file to set the following options automatically each time you open a SunIPC window:

- Automatic use of the file redirector
- Paths specific to your needs
- Personalized startup programs
- Customized MS-DOS prompt

In this way, you can set up a specific working environment for each of your SunIPC sessions, independent of the SunIPC board that you use.

Who Should Have a Board-independent File?

If you have shared access to one or more remote SunIPC boards and want to set certain options whenever you open a SunIPC window, you should create your own board-independent `autoexec.bat` file.

If you have exclusive access to a *local* SunIPC board, you do not need to create and maintain a board-independent `autoexec.bat` file. Instead, you can include any SunIPC session settings in the original, board-dependent `autoexec.bat` file.

Think about how you plan to work with SunIPC and consult your system manager before you decide how to handle `autoexec.bat` files.

Installing PC Applications

As most PC users know, software vendors sometimes implement various copy protection schemes that prevent unauthorized copying of PC application programs. When you use an independent PC, you can always run a PC application from the distribution floppy disk (or a backup copy of it). In addition, depending on the copy protection scheme, you can sometimes install the application on your PC's hard disk.

When you use SunIPC, installing and running PC applications can become more complicated, for several reasons:

- The SunIPC board you are using might not have an associated floppy disk subsystem.
- Some copy protection schemes do not allow you to install certain PC applications on any type of hard disk. In this case, if you do not have a floppy disk subsystem, you cannot run the application.
- Although some copy protection schemes *do* allow you to install PC applications on hard disks, these installation procedures might not work with a SunIPC logical hard disk or with an NFS server's disk. This is because SunIPC and NFS server disk structures do not match the structure expected by these copy protection schemes.

If You Do Not Have a Floppy Disk Drive...

If the SunIPC board you are using does not have a floppy drive, do one of the following:

- Install the applications on the associated SunIPC logical hard disk.
- Use the redirector to gain access to the drive where the files are located. Details for tailoring the director to match your needs are included in Chapter 6, *Using the File Redirector*.
- Install the applications on a network server's disk and mount the appropriate file system.

If You Cannot Install an Application on a Hard Disk...

Some copy protection schemes do not allow you to install a given application on any type of hard disk. In this case, none of the preceding options is possible.

WARNING: If you try to install an application on a logical or physical hard disk when the application's copy protection scheme does not allow it, you risk damaging your application distribution disks.

Using Key Disks

Some copy protection schemes allow you to install a given PC application on a hard disk, but require you to use a *key disk* when you run the application. The key disk is a floppy disk whose presence guarantees that only one user at a time can use the application software. In general, you can install applications with this type of copy protection scheme on either a SunIPC logical hard disk or an NFS server's disk.

In order to run a PC application that uses a key disk copy protection scheme, there must be a SunIPC floppy disk subsystem connected to the SunIPC board that you are using. This is where you insert the key disk.

Reading License Agreements

In any case, it is recommended that you read the license agreements for each PC application carefully before you try to install it on a SunIPC logical disk or a PC-NFS server's disk. If you still are not sure if it is legal to install the application this way, check with the software vendor.

For details on using the redirector to access files through the UNIX file system, see Chapter 6.

For recommendations on installing applications on an NFS server's disk, see the manual *PC-NFS*.

Using SunIPC Disk Drives

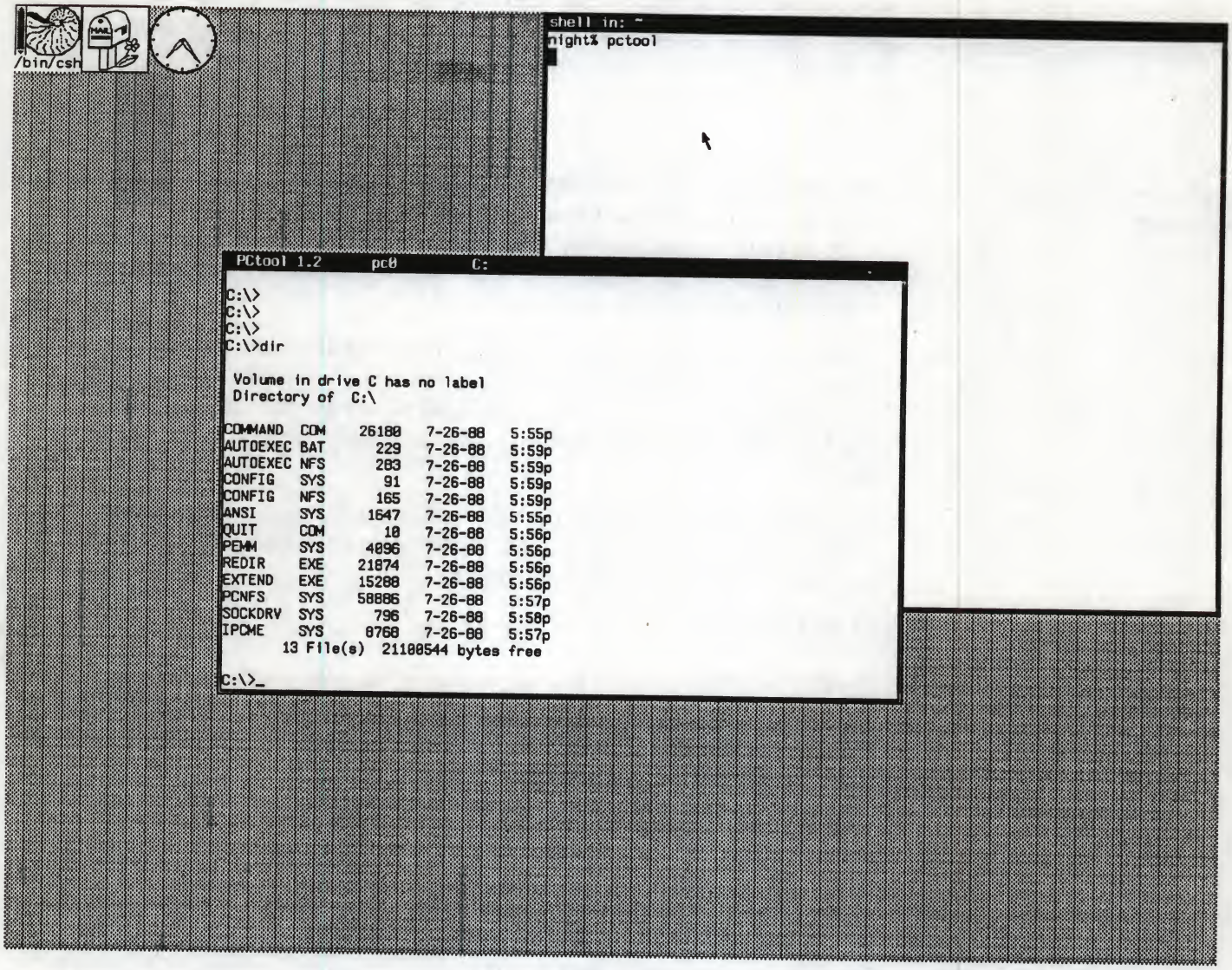
An earlier section in this chapter explained how to use SunIPC drives A and B when working with the optional floppy disk subsystem. The following sections describe how to refer to and use SunIPC drives C–Z. These sections present the standard settings that you might use for these SunIPC (logical) disk drives. You can change these settings, as described in the section *Changing Default Drive Assignments* .

Drives C and D: The MS-DOS File System

By default, drive C *is* the SunIPC logical hard disk. You can thus use drive C as your point of reference just as you would if you were using an independent PC. You can also use drive D as a logical hard disk. You can set the pathname and drive type for this drive with entries in the configuration file.

Figure 4-5 shows a sample display from the MS-DOS `dir` command. This display shows you typical contents of a SunIPC logical hard disk.

Figure 4-5 *SunIPC Logical Hard Disk Contents*



Drives D–Z: Accessing Remote File Systems

Earlier sections in this chapter described using SunIPC drives A and B for floppy disk operations and drive C for access to the SunIPC logical hard disk. When you work with a SunIPC window, the redirector allows you to use additional (logical) drives: drives D–Z. These logical drives are available so that you can have access to files on your Sun Workstation.

Changing Default Drive Assignments

The preceding sections described the standard SunIPC disk drive assignments for drives A–Z. You might find, however, that you want to set up different drive assignments for a single SunIPC session or for all future sessions. For example, if you are using a SunIPC single-drive floppy disk subsystem, you might want your SunIPC logical hard disk to be drive B.

In addition, certain PC applications search for related data files on drive B, on a floppy disk. But you might prefer to store these data files on the SunIPC logical hard disk, on drive C. In this case, you could use the MS-DOS `assign` command to redirect the system to drive C whenever the PC application directs it to drive B.

Let us assume that you plan to run a PC application that requires data files to reside on drive B. In your case, these data files are on a remote file system that you mounted on drive F. You would type

```
> assign b=f
```

The PC application can now find the necessary data files on drive F. This new drive assignment affects all commands that refer to drive B. The change remains in effect until you enter the `assign` command a second time without any arguments or shut down and restart MS-DOS.

For more information about using the `assign` command, see the *DOS User's Manual*.

Changing the Size of a SunIPC Logical Hard Disk

Initially, a SunIPC logical hard disk (file `/usr/pctool/drive_C.pcx`) occupies nearly 300 Kbytes of storage space. As you store more files and PC applications there, the logical hard disk can grow (by default) to approximately 20 Mbytes. The best way to acquire more storage is to use a network disk from the start, which you can access through the redirector or through PC-NFS.

If you do use the SunIPC logical hard disk for storage, you may need to reset the size of the hard disk for two reasons:

1. If a logical hard disk grows to its full 20 Mbytes, it can become too large for the local disk of the Sun system in which the SunIPC board is installed. In this case, you would want to reduce the size of the logical hard disk.
2. If you want to install many PC applications on a SunIPC hard disk, 20 Mbytes might not be enough space. In this case, you would want to increase the size of the logical hard disk.

It is best to change the size of a SunIPC logical hard disk when you first receive the SunIPC board. Later, backup time might be greatly increased by the installation of PC application programs on the logical hard disk.

You can follow the procedure described in this section to make the appropriate adjustment. Changing the size of a SunIPC logical hard disk destroys the existing drive C.

Be sure to uninstall any copy-protected software before resizing drive C.

The Procedure

This procedure shows how to increase your drive C to 30 Mbytes (a type 4 disk):

1. Change directory to `/usr/pctool`.
2. Create the file that will be your new hard disk with this command:

```
% cp files/drive_C.pcx new_drive.pcx
```

3. Edit the `config.pcx` file to allow access to the disk you just created. Change the `DRIVE_D` line to the following:

```
DRIVE_D /usr/pctool/new_drive.pcx
```

4. Start `pctool`.
5. If you want to enlarge the disk, run the `setup` program, setting the drive type to 4. If you ordinarily use two logical hard disks, you must remember the previous drive type for drive D. You will restore this type in Step 7.

Note: If you have copy-protected software on drive C, you must uninstall it before performing this copy, then reinstall it when done.

6. Copy all the data from drive C to drive D by using the `xcopy` command:

```
> xcopy c:*.* d: /s
```

7. If you are enlarging the disk, run the `setup` program again. Specify drive C as a type 4 device. Return drive D to its former device type (from Step 4) or specify it as not installed if you do not want to use it.
8. Exit `pctool`.
9. Edit the `config.pcx` file to change the `DRIVE_D` line back to its original setting.
10. Move the old `drive_C.pcx` to `backup.pcx`:

```
% mv drive_C.pcx backup.pcx
```

11. Move the new drive C to `drive_C.pcx`.

```
% mv new_drive.pcx drive_C.pcx
```

When you are sure that the new drive is working correctly, you can delete the `backup.pcx` file.

Changing the Location of a SunIPC Logical Hard Disk

As explained in the section *About Hard Disk Emulation*, the SunIPC logical hard disk is actually a large file that resides on the disk of some node on your network. By default, the path to this file is

```
/usr/pctool/drive_C.pcx
```

where *x* is a number between 0 and 3 that specifies one of the SunIPC boards that is installed on a Sun Workstation.

Because the SunIPC logical hard disk is a very large file — often occupying several Mbytes of disk space — you might prefer to move this file to a larger disk. You (or your system manager) can change the location of a SunIPC logical hard disk by editing the configuration file for the SunIPC board that is associated with that logical hard disk. The path to this configuration file is `/usr/pctool/config.pcx`, where *x* is the same variable as in the path `/usr/pctool/drive_C.pcx`. You can specify an alternate location for the configuration file by using the `-p` option with the `pctool` command. See Chapters 2 and 8 if you need more information on using this command.

The format of each line in a SunIPC configuration file is

```
KEYWORD      VALUE
```

where `KEYWORD` is one of the possible elements in this file and `VALUE` is the setting you assign to the element. (See Table 4-1 for a list of the configuration file keywords and their default settings.)

To change the location of a SunIPC logical hard disk, use a text editor to enter (or edit) the following line in the appropriate `/usr/pctool/config.pcx` file:

```
DRIVE_C      path
```

where *path* is the desired path to the logical hard disk. For example, to move the logical hard disk for a SunIPC board to private disk directory `/usr2/julie/drive_C`, you could enter this path opposite the keyword `DRIVE_C` in the appropriate configuration file as follows:

```
DRIVE_C      /usr2/julie/drive_C
```

Who Should Edit a SunIPC Configuration File?

Generally, only a system manager should edit SunIPC configuration files because any changes made to a SunIPC board's configuration file affect all users who share that board. Limiting access to configuration files in this way helps to coordinate these edits. If you are your own system manager, however, you can edit this file (or files) as described here and in Chapter 5.

If you have personal requirements for the SunIPC (such as your own drive D), it is recommended that you specify your own personal configuration file. You can do this by setting the environment variable CONFIG.PC to the name of your configuration file, or by always running `pctool` with the `-p` *config file* option.

Table 4-1 lists and defines the keywords you can enter in a SunIPC configuration file. This table also shows the default value for each keyword, where appropriate. The default value is in effect for a given keyword when any of the following is true:

- The SunIPC configuration file is not present.
- There is no keyword of that name listed.
- The file associated with the keyword is inaccessible.

The Default Configuration File

These are the valid fields in the configuration file, and their default values:

Table 4-1 *Configuration File Fields and Default Values*

Name	*Default Value*
ROM	$PCTOOLDIR/rom_bios.pc
CMOS	$PCTOOLDIR/cmos_ram.pc*
DRIVE_C	$PCTOOLDIR/drive_C.pc*
TYPE_C	2
DRIVE_D	<no default>
TYPE_D	2
COM1	<no default>
COM2	<no default>
LPT1	eval ${LPT1:-lpr}
LPT3	eval ${LPT3:-'psfx80 $PCTOOLDIR/files/psfx80.pro | lpr'}
XPMEM	1024
NORMFONT	$PCTOOLDIR/pcfont.r.14
BOLDFONT	$PCTOOLDIR/pcfont.b.14

$<anything> is expanded to the value of the environment variable <anything>.

~ is your home directory.

~user is user's home directory.

* is replaced by the SunIPC board number.

$PCTOOLDIR is the value of the PCTOOLDIR environment variable, or of `/usr/pctool` if PCTOOLDIR is not set to a value.

The ROM is the BIOS ROM image to use for the SunIPC. You must use the BIOS ROM delivered with SunIPC 1.2. You cannot use a SunIPC 1.1 ROM image or a Sun386i image.

CMOS controls the cmos_ram image for the emulation. This file can be manipulated by the `setup` program. This file controls the number of floppies and hard disks that the BIOS recognizes, as well as the default monitor type.

DRIVE_C describes the file used to emulate the C drive. This file controls which `autoexec.bat` and `config.sys`files you use when booting the SunIPC.

TYPE_C specifies the drive type of logical hard disk C.

DRIVE_D describes the optional second emulated hard drive in the system.

TYPE_D specifies the drive type of logical hard disk D.

COM1 and COM2 describe the serial ports in your system. Typically, they reference a serial device in your system, such as `/dev/ttya`.

LPT1 and LPT3 refer to the emulated parallel ports in your system. (You also have a hardware parallel port as LPT2.) The complicated default string supports the $LPT1 and $LPT2 environment variables. The true default sends output to LPT1 through the `lpr` program (as ASCII text), and output to LPT3 through the psfx80 filter, which emulates an Epson fx80, and outputs Postscript codes.

XPMEM controls the amount of expansion memory that your system emulates. The default is one Mbyte.

NORMFONT specifies the normal system font.

BOLDFONT specifies the bolface version of the system font.

Contents of the Default C Drive

The following table lists the contents of the default logical drive C and describes each file.

Table 4-2 *Contents of Default C Drive*

File Listing	*Description*
command.com	Normal MS-DOS command interpreter
quit.com	Program to exit the SunIPC
redir.exe	Resident program to redirect file I/O
extend.exe	User interface for redirector
autoexec.bat	Command startup file
config.sys	MS-DOS configuration file
pemm.sys	EMS driver for the SunIPC
ansi.sys	Enhanced MS-DOS console driver
autoexec.nfs	Alternate `autoexec.bat` for PC-NFS
config.nfs	Alternate `config.sys` for PC-NFS
pcnfs.sys	PC-NFS driver for PC-NFS
ipcme.sys	"Memory Ethernet" driver for PC-NFS
sockdrv.sys	Socket driver for PC-NFS

This chapter discussed using floppy disks and a logical hard disk to work with SunIPC. Chapter 5 describes performing I/O operations with emulated devices and using printers with SunIPC.

5

Using Emulated I/O Devices

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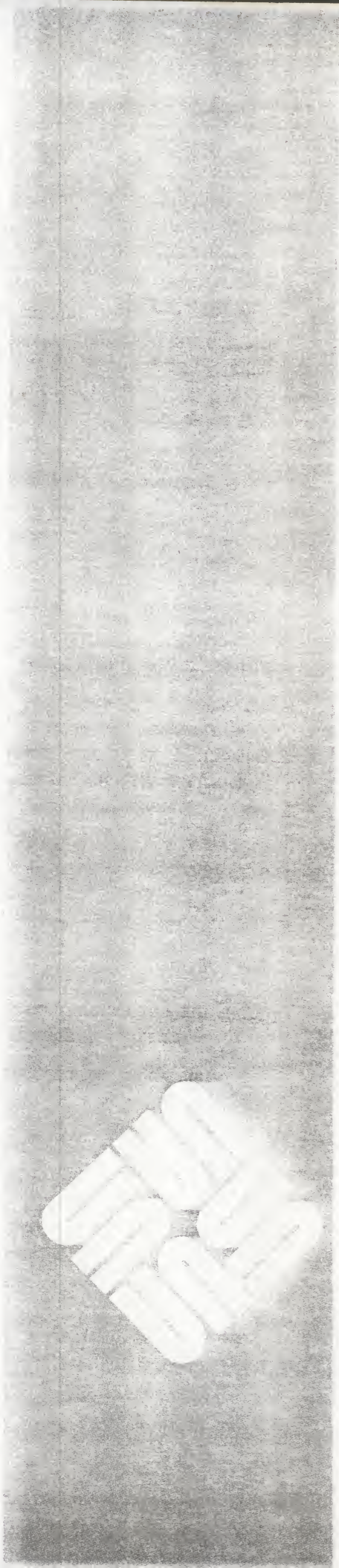


5

Using Emulated I/O Devices

As the preceding chapters have shown, working with SunIPC is very much like working with an independent PC. However, because SunIPC operates within a Sun window, it does not include the full range of physical I/O devices that are part of the PC environment. SunIPC does supplement physical devices with *emulated I/O devices* that you can use in place of their physical counterparts to perform I/O operations.

Specifically, SunIPC provides the following physical I/O devices:

- Optional floppy disk drive(s).
- 1 parallel port on the SunIPC board. You can connect a parallel printer directly to this port.

Each SunIPC board also provides the following emulated I/O devices:

- Logical hard disks (as many as two)
- 2 serial ports located on the Sun Workstation in which the SunIPC board was installed
- Microsoft bus mouse
- Lotus/Intel memory expansion standard
- 2 PC printers emulated by printers in your Sun environment

Chapter 4 described how to work with the SunIPC logical hard disk. This chapter describes how to work with the rest of the emulated I/O devices. This chapter contains the following sections:

- *Connecting Devices to SunIPC Ports* — Summarizes how to connect devices to the parallel and emulated serial ports. This section also describes editing a SunIPC configuration file.
- *Using the Microsoft Mouse Driver* — Gives guidelines for when this driver program is required and how to load it.
- *Using the Memory Expansion Standard* — Describes how to edit a SunIPC configuration file to use the emulated Lotus/Intel memory expansion standard.
- *Using Printers* — Describes how to print SunIPC files on the default printers for your Sun Workstation. This section also discusses sending files to other

printers in your Sun environment, entering SunIPC files in a printer queue, and using PC-NFS to print SunIPC files.

You can refer to SunIPC communications ports and printers with MS-DOS logical device names. Table 5-1 shows you how (by default) MS-DOS logical device names correspond to SunIPC physical and emulated devices.

Table 5-1 *SunIPC Device Names*

MS-DOS Name	SunIPC Device
COM1	Emulated serial port
COM2	Emulated serial port
LPT1	Default printer for your Sun Workstation
LPT2	Parallel printer connected to the on-board parallel port
LPT3	Default printer for your Sun Workstation (assumes Sun LaserWriter)
PRN	Same as LPT1

To illustrate the use of emulated I/O devices, this chapter contains some MS-DOS command examples. You can find many more examples in the *DOS User's Manual*.

5.1. Connecting Devices to the SunIPC Ports

This section offers guidelines for connecting devices to the SunIPC parallel and emulated serial ports.

Parallel Port

The parallel port on the SunIPC board itself is available for connecting a parallel printer. In this way, you can use PC peripherals when you work with SunIPC. For information about sending data to this type of printer, see the section *Using a Parallel Printer*.

Emulated Serial Ports

You can use the two emulated serial communications ports to connect a modem, printers, and other devices to use with SunIPC. The following sections summarize the steps you take to connect a device in this way:

If you are using a serial device with a remote SunIPC board, connect the device to a serial port on the Sun

Workstation in which the SunIPC board you are using is installed, *not* to a serial port on the Sun Workstation where you are working.

1. Configure the emulated serial port according to the documentation for the specific device.
2. Physically connect the device to a serial port on the Sun Workstation in which the SunIPC board is installed. (See Figure 5-2 for an example of this connection.)
3. Edit the configuration file for the SunIPC board you are using.

What if Someone is Already Using the Serial Ports?

Read this section if you have remote access to one or more SunIPC boards.

If you are using a remote SunIPC board, the emulated serial ports available to you are the physical serial ports on the Sun Workstation in which this remote board is installed. Under these circumstances, there might be a user at that Workstation who also wants to connect I/O devices to these serial ports. When such a situation arises, SunIPC software gives *you* priority use of these serial ports.

If you edit a SunIPC board's configuration file to set up the use of a serial device, as described in the section *Editing the SunIPC Configuration File*, you then have exclusive access to the associated serial ports whenever you open a SunIPC window. Thus, if someone else is using these serial ports, opening a SunIPC window disrupts the operation of this user's serial device(s) and gives you complete control of the serial ports. You then maintain control of the serial ports until you finish using the SunIPC board.

When using a remote SunIPC board, you should coordinate your use of the emulated serial ports with the user at the Sun Workstation where this SunIPC board is installed.

Configuring Emulated Serial Ports

Before you connect an I/O device (such as a printer) to one of the emulated serial ports, you must configure the port appropriately. Configuring an emulated serial port consists of setting the following parameters with the MS-DOS `mode` command:

- Baud rate — the rate at which data moves across the communications line between your SunIPC board and the I/O device
- Parity — the type of error checking used during I/O operations
- Data bits — the number of electrical signals that make up a character
- Stop bits — the number of electrical signals that mark the end of a character

The *DOS User's Manual* contains examples of setting these parameters with the `mode` command, as well as a table that shows the range of values you can set for each parameter.

Editing the SunIPC Configuration File

As described in Chapter 4, each SunIPC board has its own configuration file called `/usr/pctool/config.pcx`. *x* is a number between 0 and 3 that represents the number of the SunIPC board on the Sun Workstation in which it is installed. Your system or network manager should give you a list of available SunIPC boards that includes these numbers.

When you use a device such as a modem with SunIPC, you or your system manager must edit the configuration file for the SunIPC board you are using. Editing the configuration file consists of entering the device name for the Sun Workstation serial port opposite the logical device name for this port (keyword COM1 or COM2). Editing the configuration file in this way associates the logical device name (COM1 or COM2) with a physical serial port on the Sun Workstation.

As discussed in Chapter 4, editing the configuration file for a SunIPC board affects anyone who uses that board. Therefore, it is best if your system manager makes these changes. If you are your own system manager, be sure to coordinate these edits with other users who share your SunIPC board(s).

Assume you want to connect a modem to COM2. You would enter the device name for a serial port on the Sun Workstation where the SunIPC board you are using is installed (in this case, `/dev/ttyb`) opposite the keyword `COM2` in the appropriate configuration file (`/dev/ttya` for `COM1`).

If you no longer want to connect the modem each time you open a SunIPC window, delete the device name `/dev/ttyb` from the SunIPC configuration file.

5.2. Using the Microsoft Mouse Driver

To use your Sun mouse as a PC mouse for your applications, a mouse driver program must be present. Some PC applications already have the Microsoft mouse driver program resident in memory. However, other PC applications, such as Microsoft Multiplan, require you to install the mouse driver program yourself. If you do not install a mouse driver, you will not be able to attach the mouse when you run this second group of PC applications.

The Microsoft mouse driver program consists of two program files — `MOUSE.SYS` and `MOUSE.COM`. When you execute it, program `MOUSE.COM` makes the mouse operational. You must attach the mouse to your SunIPC window *before* running the Microsoft mouse driver program; otherwise, the driver program will fail. Once you have attached the mouse and `MOUSE.COM` has run, you can run your PC application.

As an alternative, you can edit the `config.sys` file on drive C of the SunIPC board you are using. If program `MOUSE.SYS` resides in the root directory, add the following line to file `config.sys`:

```
device=mouse.sys
```

If program `MOUSE.SYS` resides in another directory, include the complete path in this new line. For example:

```
device=c:\multiplan\mouse.sys
```

Adding a line like those shown causes the system to load the `MOUSE.SYS` program automatically each time you start a SunIPC window.

If you use this method to load the mouse driver into memory, you must remember to attach the mouse *immediately* after starting the SunIPC window. However, since the system executes file `config.sys` before displaying the first MS-DOS prompt, there is a chance that the mouse driver program will fail.

If the mouse drive program does fail, your SunIPC window displays the following message:

```
MOUSE:  Microsoft Mouse not found.
```

At this point, you can use the SunIPC menu (as described in Chapter 2) to attach the mouse and reset SunIPC hardware. This allows the system to install program `MOUSE.SYS` properly.

5.3. Using the Memory Expansion Standard

As described in Chapter 1, SunIPC supports the Lotus/Intel memory expansion standard through Sun virtual memory. This feature allows you to use 1–4 Mbytes of additional memory to work with large spreadsheets.

Chapter 1 describes the line that you must include in the `config.sys` file (on emulated drive C) of a SunIPC board in order to use this additional memory. This section describes how to edit the SunIPC board's configuration file (file `/usr/pctool/config.pc`*x*) to specify the amount of additional memory you want to use.

When you work with a physical PC, the amount of additional memory equals the amount of physical memory available on an expanded memory board. When you work with SunIPC, the amount of expanded memory is determined by the number of 1024-byte pages you specify opposite the `XPMEM` keyword in the SunIPC board's configuration file. If you do not specify a number for this keyword, SunIPC uses a default value of 1 Mbyte.

Table 5-2 shows how the number of 1024-byte pages you specify corresponds to the resulting amount of expanded memory.

Table 5-2 *Memory Expansion*

NUMBER OF PAGES	EXPANDED MEMORY SIZE
512	.5 Mbyte
1024	1 Mbyte
2048	2 Mbytes
3072	3 Mbytes
4096	4 Mbytes

Note that you do not have to specify strict multiples of 1024 when editing a SunIPC configuration file in this way.

Assume that you want to use 2 Mbytes of expanded memory. First, edit file `/usr/pctool/config.pcx` by entering the following line:

```
XPMEM    2048
```

If there is already a value set for the keyword `XPMEM`, edit the existing line. The next time you open a SunIPC window, the new amount of expanded memory will be available for you to use.

5.4. Using Printers

SunIPC provides the following print services:

- Direct access to a parallel printer
- Direct access to the default printer for the Sun Workstation you are using
- Transparent conversion of files in Epson printer format to Sun LaserWriter laser printer format
- Access to any printer in your Sun environment
- Additional support for one or two serial printers
- PC-NFS access to remote printers

If you are using PC-NFS file access (you are if you find the `net start rdr` *pc_name* * command line in either the board-dependent or board-independent `autoexec.bat` file), do not use the MS-DOS `print` command with SunIPC. Instead, use the PC-NFS `net print` command, as described later in this chapter.

You can perform all of the above print operations by associating MS-DOS logical device names LPT1, LPT2, and LPT3 with various printers in your Sun environment. The following sections contain instructions for performing these SunIPC print operations.

Using Default Printers

When you first open a SunIPC window, MS-DOS logical device names LPT1, LPT2, and LPT3 refer to specific (default) printers on your network. (Your system manager or network administrator is responsible for setting these default printer assignments for each workstation.) Initially, the following assignments are in effect:

- LPT1 refers to the default printer for the Sun Workstation you are using. This printer can be a Sun LaserWriter laser printer or some other type, such as a high-speed printer. You can send ASCII text files to LPT1.
- LPT2 refers to the parallel printer connected to the parallel port on the SunIPC board you are using.

- LPT3 refers to the default printer for the Sun Workstation you are using. In contrast to LPT1, however, the default printer for LPT3 is a Sun LaserWriter laser printer that automatically converts files in Epson printer format to PostScript format.

In effect, copying a file to LPT1 or LPT3 is like entering the UNIX `lpr` command: unless you specify a particular printer, the system sends your file to the default printer for the Sun Workstation you are using. The way information is formatted when it is sent to LPT1 and LPT3 is determined by settings in the `usr/pctool/config.pcx` file. For more information on these settings in the default configuration file, see Chapter 4, *Using Disks*.

The following sections explain how to print your SunIPC files on these default printers.

A Word About the MS-DOS `print` command

As mentioned earlier, if you are using PC-NFS file access, use the PC-NFS `net print` command instead of the MS-DOS `print` command. If you are not using PC-NFS file access, however, you can use the MS-DOS `print` command as usual.

When you enter the `print` command, SunIPC sends the file you specify to the printer associated with the logical device name PRN. Initially, PRN refers to whichever printer is associated with the logical device name LPT1. If, however, you want to convert a file in Epson printer format and print it on a Sun LaserWriter, you must reassign PRN in order to use the `print` command.

You can change the printer that PRN refers to in two ways:

1. Use the MS-DOS `mode` command as follows:

```
> mode PRN:=LPTn
```

where *n* is 1, 2 or 3.

2. Redefine PRN when you first enter the `print` command after starting up MS-DOS. (The operating system prompts you for this specification.)

For more information about logical device name PRN and the `mode` and `print` commands, see the *DOS User's Manual*.

Using a Parallel Printer

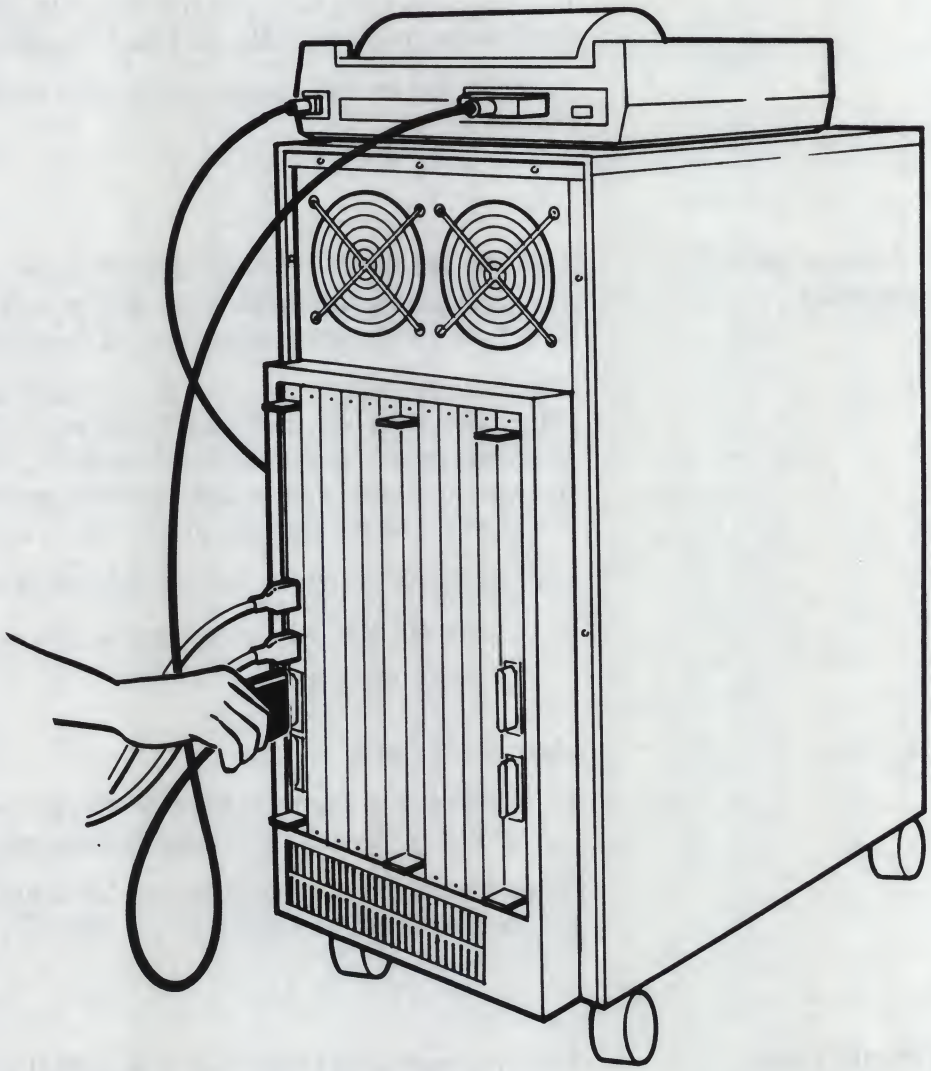
When you work with a SunIPC window, logical device name LPT2 refers to the printer connected to the parallel port on the SunIPC board that you are using. Once you have connected a parallel printer to this parallel port, you can use the MS-DOS `copy` command to print your SunIPC files.

Assume that you have connected an Epson FX80 printer to the parallel port on a local SunIPC board. To print a file called `epson.dat` on the FX80 printer, you would type

```
> copy epson.dat LPT2:
```

Figure 5-1 shows an Epson FX80 printer connected to the parallel port on a SunIPC board.

Figure 5-1 *Connecting a Parallel Printer*



Using Your Sun Workstation's Default Printer

When you open a SunIPC window, by default, logical device name LPT1 refers to the default printer (set by your system manager) for the Sun Workstation that you are using. You can send all of your SunIPC files to this printer, unless at least one of the following is true:

The default printer for LPT1 is the default printer for the Sun Workstation that you are using, *not* the Sun Workstation in which the SunIPC board you are using is installed.

- The files you want to print are in Epson printer format. The section *Reformatting Data for a Sun LaserWriter* contains instructions for printing this type of file.
- The files you want to print are in a specific format for some other printer. SunIPC does not support sending files in these formats to printers on a Sun network.

To send a SunIPC file to the default printer for the Sun Workstation you are using, type

```
> copy filename LPT1
```

Reformatting Data for a Sun LaserWriter

When you open a SunIPC window, by default, logical device name LPT3, like logical device name LPT1, refers to the default printer for the Sun Workstation that you are using. However, the printer associated with logical device name LPT3 converts files that are in Epson printer format to the Postscript format used by a Sun LaserWriter laser printer.

When you install them, some PC applications (such as Lotus 1-2-3, Symphony and WordStar) require you to identify the type of printer you plan to use. If you want to use the SunIPC conversion filter with these applications, select the FX series of Epson printers.

Let us assume you want to print file `epson.dat` (previously printed on an Epson FX80 printer in section *Using a Parallel Printer*) on a Sun LaserWriter laser printer. You would type

```
> copy epson.dat LPT3
```

A Few Notes on Epson-to-LaserWriter Conversion

When you print files that are in Epson format on a Sun LaserWriter, as described in the preceding section, conversion of file formats is largely transparent. There are, however, a few differences to keep in mind. When you convert files in this way, remember that Sun LaserWriter laser printers do not do the following:

- Print Epson-formatted graphics.
- Accept the `font download` command. You cannot send your own set of character definitions to this type of printer.
- Print ligatures such as AE, ae and pt. If you include these ligatures in a file, Sun LaserWriters print a space instead.
- Print the same number of characters per line and lines per page as Epson printers do. Epson printers can fit 85 10-pitch characters on an 8.5"-wide piece of paper; Sun LaserWriters can fit only 80 characters. Epson printers can fit 66 lines at 6 lines per inch on an 11"-long piece of paper; Sun

LaserWriters can fit only 63 lines.

Sun LaserWriters print fewer characters per line and fewer lines per page, because, by default, these printers maintain .25" character-free borders around the edges of each piece of paper. Unless you make adjustments for this difference between Epson printers and Sun LaserWriters, you lose the data that does not fit on each page. You can often adjust for this discrepancy in characters per page when you run your PC applications by resetting the maximum number of characters per line to 80 and the number of lines per page to 63.

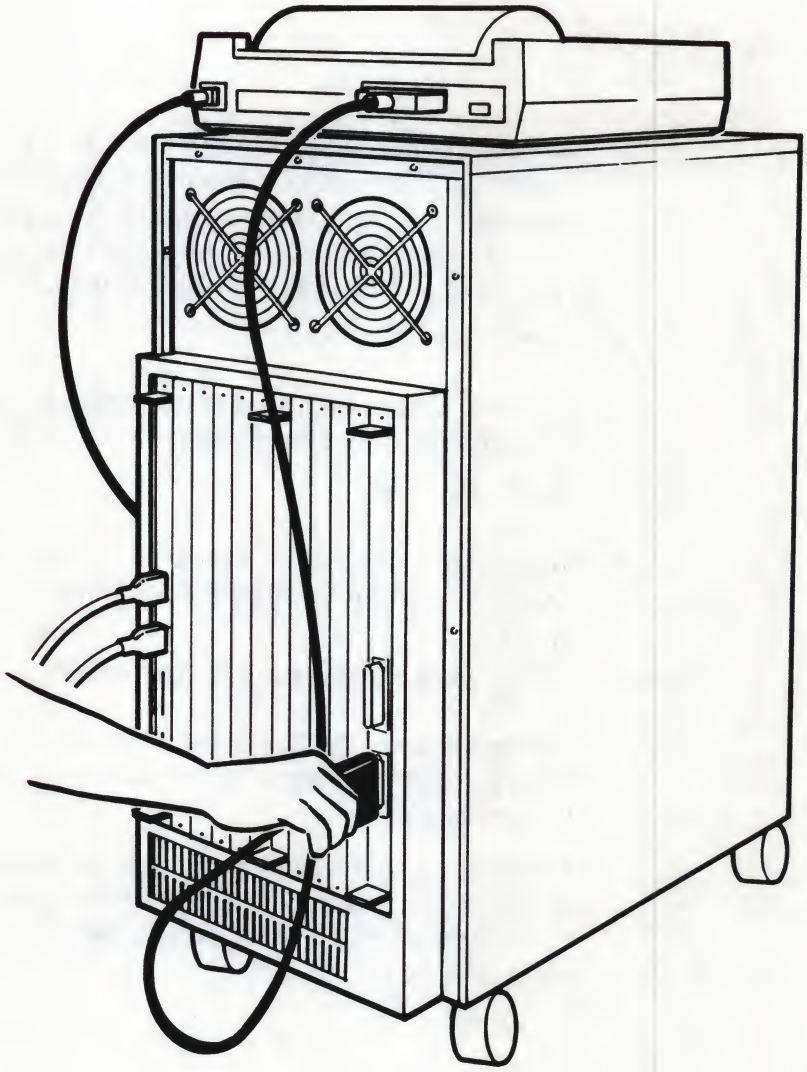
Finally, when using an application-specific print program, remember that interrupting the print program does not prevent an incomplete print job from going to the printer. As described in the section *How SunIPC Queues Print Requests*, SunIPC sends print jobs to the printer after one minute has elapsed. Therefore, interrupting a printer program may cause pieces of your job to print independently.

Using a Serial Printer

You can use a serial printer instead of, or in addition to, a parallel printer when you work with a SunIPC window. To do this, follow these steps:

1. Use the MS-DOS `mode` command to configure COM1 or COM2, one of the emulated serial ports at the back of the Sun Workstation where the SunIPC board you are using was installed. Set the four configuration parameters according to your documentation for the specific serial printer.
2. Physically connect the serial printer to the communications port as shown in Figure 5-2 .

Figure 5-2 *Connecting a Serial Printer*



3. Use the `mode` command as follows:

```
> mode <printer> = COMn
```

where *printer* is the MS-DOS logical device name with which you want to associate the serial printer (LPT1, LPT2, or LPT3) and *n* is 1 or 2.

For example, the following command line associates LPT3 with COM2:

```
> mode LPT3 = COM2
```

When you have finished using the serial printer and want to free up logical device name LPT3, type

```
> mode LPT3
```

Specifying Printers

When you print your SunIPC files, you can specify printers on your network other than the default printers described in the preceding sections. You can do this by changing the printer(s) associated with MS-DOS logical device names LPT1 or LPT3. To do so, replace the line that specifies printer devices in the `/usr/pctool/config.pcx` file with the following line:

```
LPTn lpr -Pxxx
```

where *n* is either 1 or 3, and *xxx* is a printer specification. For example, the following command line associates LPT3 with `dpp`, a high-speed printer:

```
LPT3 lpr -Pdpp
```

In fact, if the default printers for LPT1 and LPT3 were not already set up, you could do it yourself by entering the following command lines:

```
LPT1 lpr
LPT3 /usr/bin/psfx80 | lpr -hfP
```

The second command line explicitly specifies the Epson–LaserWriter conversion filter, described more fully in the next section, *Specifying the LaserWriter Conversion Filter*.

Changing the printer environment variable for SunIPC in this way is similar to specifying different printers with the UNIX `lpr` command. (You can also use PC-NFS to work with printers, as described in the section *Using PC-NFS to Print SunIPC Files*.)

Specifying the LaserWriter Conversion Filter

As described in the section *Reformatting Data for a Sun LaserWriter*, you can print files intended for an Epson printer on a Sun LaserWriter laser printer. One way to do this is to send these files to `LPT3`, a Sun LaserWriter laser printer that is the default printer for the Sun Workstation that you are using. By default, `LPT3` automatically converts files from Epson to PostScript format.

Assume you want to print a file called `records` that is in Epson printer format on a Sun LaserWriter. You previously associated LPT3 with a high-speed printer, so this MS-DOS logical device name does not currently provide automatic conversion of file format. In this case, before you open a SunIPC window, you could change the `config.pcx` file:

```
LPT1 /usr/bin/psfx80 | lpr -h
```

This command line enables the system to convert files to the appropriate format for a Sun LaserWriter laser printer before sending them to the printer associated with LPT1 (still the default printer for the Sun Workstation you are using). You could then open a SunIPC window (as described in Chapter 2) and type

```
> copy records LPT1
```

How SunIPC Queues Print Requests

When you use a "real" PC, you generally have sole access to a printer. Because you are the only user who sends files to this printer, you never need to wait for MS-DOS to process your print requests. As a Sun Workstation user, however, you are accustomed to sharing a printer with other users. Sharing a printer often means entering your print requests in a queue and then waiting for the system to print your files in turn.

When you work with SunIPC, you can still use the MS-DOS `copy` command to send files to a printer. However, unless you are using a printer that is connected to one of the three SunIPC communications ports (COM1, COM2, or LPT2)—and thus dedicated to you during your SunIPC session—you will be using a printer on your network that you share with other users.

When you send a file to a printer associated with LPT1 or LPT3, SunIPC delays entering your file in the printer queue until one of the following conditions occurs:

1. You exit the SunIPC window.
2. One minute has elapsed since you last sent print data to the logical device name in question (LPT1 or LPT3).
3. You select the SunIPC menu option `Send to printer` and then select the printer in use, LPT1 or LPT3.

SunIPC delays sending your files to printer queues in this way to ensure that, as often as possible, printer jobs encompass entire files and not pieces of files. This additional control of jobs helps prevents files from printing in separate pieces that might then be interspersed with pieces from other files.

If you are not sure whether your file has actually been sent to the printer, enter the UNIX `lpq` command. This command displays the contents of the queue for the printer you specify.

Using PC-NFS to Print SunIPC Files

If you are using PC-NFS access, you can extend the scope of SunIPC print operations. The manual *PC-NFS* contains information on using PC-NFS commands to perform these print operations. This section summarizes the most basic of these operations.

Using PC-NFS commands allows you access to a greater number of printers during a SunIPC session than using UNIX commands because you can enter PC-NFS commands to MS-DOS inside a SunIPC window.

Once you have opened a SunIPC window, you can use PC-NFS commands to send your SunIPC files to printers other than the default printer for the Sun Workstation you are using. You can do this by redirecting the output from LPT1, LPT2, or LPT3 to another printer with the command line

```
> net use printdevice: \\hostname\printername
```

where *printdevice* refers to LPT1, LPT2 or LPT3. This command line redirects files that you send to MS-DOS logical device name *printdevice* to *printername* on the PC-NFS server *hostname*. Your system manager can tell you the names of the printers on your network that you can use.

Before you can enter the `net use` command, you might sometimes need to cancel an existing printer redirection with the following command line:

```
> net use printdevice:/d
```

After you have redirected printer output with the `net use` command, you can print a file by using either of the following:

- The MS-DOS `copy` command
- The PC-NFS `net print` command

Using the MS-DOS `copy` command (as described in other sections of this chapter) is not the best method when you are printing a large file. The PC-NFS `net print` command is much faster. The command line for this command is as follows:

```
> net print filename LPTn
```

where *filename* is the name of the file you want to print and *n* is 1, 2, or 3. If you do not specify an MS-DOS logical device name, SunIPC assumes you want to print your file on the printer associated with LPT1.

Remember, the `net print` command works with redirected print devices only. If you have not redirected the output for printer `LPTn`, you will see the following system message:

```
NFS041F : You have not done a
NET USE lptn \\hostname\printername.
```

This chapter showed you how to configure SunIPC communications ports and send your SunIPC files to printers on your network. For further examples of specific procedures, see the *DOS User's Manual* and *PC-NFS*.

6

Using the File Redirector

Using the File Redirector **109**

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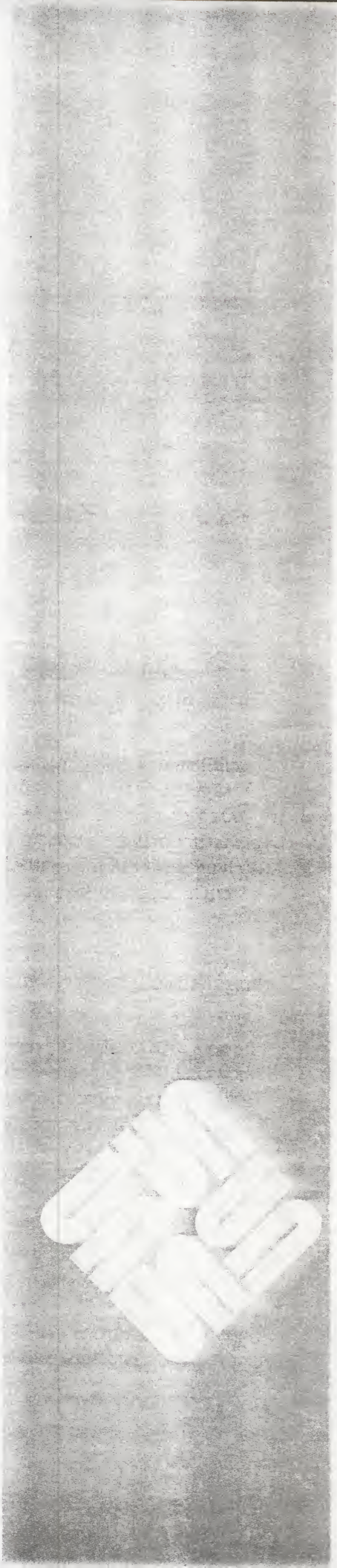

6

Using the File Redirector

This chapter describes how to use the SunIPC 1.2 file redirector to gain fast direct access to the UNIX file system.

6.1. Accessing UNIX Files with the Redirector

With SunIPC 1.2, you have two ways to access resident UNIX files: the file redirector and PC-NFS. This chapter discusses the redirector, and the next describes using PC-NFS.

One of the most significant enhancements in SunIPC 1.2 is the inclusion of the *file redirector*. The redirector functions similarly to PC-NFS in that it maps local MS-DOS file access to the UNIX file system. Unlike PC-NFS, however, the redirector does not require you to configure the SunIPC as a separate machine on the network. Instead, it uses a direct memory-mapped connection to the Sun. It therefore *inherits* access to the Sun host-mounted file systems.

Although the file redirector can access any file on the network that you have access to, it can only access files that the host Sun can access since it uses its file system. Therefore, `pctool` clients connected to a remote SunIPC board inherit the file system of the machine with the SunIPC installed, not the file system of the Workstation executing `pctool`.

Two DOS programs comprise the redirector:

- `redir`
- `extend`

Both are included in the default `autoexec.bat` file and run automatically when SunIPC is started.

Command Format

`redir` is a small resident program that *redirects* access to certain drives to the Sun. It takes no arguments, and must be run before you run `extend`.

`extend` is the user interface program for the redirector. It handles the management of the redirection. Its basic command formats are as follows:

- `extend`
- `extend d:-`

- `extend d:<pathname>`
- `extend d:=<current-dir>`
- `extend +r`
- `extend -r`

A brief description of each command is listed in the following table. For more information, see the *DOS User's Manual.*

Table 6-1 `extend` *Command Format*

Command	*Description*
d:	Specifies an MS-DOS drive letter, up to the last legal drive (as specified by the config.sys LASTDRIVE= line).
<pathname>	Specifies a Sun pathname that may contain environment variables.
extend	Prints out the current file mapping.
extend d:<path>	Makes d: a valid redirected drive with <path> as the prefix for the drive.
extend d:=<cd>	Makes d: a valid redirected drive with <cd> as the initial directory.
extend d:-	Restores d: as a normal drive.
extend +r	Enables the redirector (the default).
extend -r	Disables the redirector.

Pathnames may have embedded environment variables ($HOME, for example). $CD is a special meta variable defined by `pctool`; CD is the directory from which you started `pctool`. The default `extend` command in `autoexec.bat` is as follows

```
extend e:=$CD h:$HOME n:/usr/pctool r:
```

This command maps the following:

- e: starting at the root with the initial position of your current directory
- h: starting at your home directory
- n: starting at the /usr/pctool directory
- r: starting from the root

Mapping Filenames

Clients using MS-DOS filenames which contain characters from international character sets may have problems in this area.

The redirector occasionally modifies UNIX filenames to make them fit MS-DOS conventions. MS-DOS filenames consist of an eight-character name and a three-character extension, separated by a dot. If the UNIX filename does not fit this model, the redirector modifies the name to fit MS-DOS conventions.

In brief, any of the following circumstances cause a UNIX name to be modified:

- It contains a capital letter.
- It does not fit the eight-character name/three-character extension model.
- It contains illegal MS-DOS characters: " . / [ ] : | < > + = ; , (or a space).

The redirector's mapping algorithm uses the following rules in mapping filenames:

- The redirector uses the first five characters of the original filename, as far as possible.
- All letters are forced to uppercase.
- Illegal MS-DOS characters are replaced by the tilde (~) character.
- Any legal MS-DOS extension is appended.

This algorithm always yields a name with a tilde (~) character replacing any illegal character. This characteristic allows you to perform a wildcard search to find files easily.

A remapped name generally has several characters, a few tildes ('~'), followed by another two characters, as in this sample directory:

```
C:>xdir r:\tmp

 Volume of drive R is SunOS
 Directory of \tmp\


 ..             <DIR>       6/30/88    6:39p  ..
 MTDA0~BL           34      7/01/88    4:01p  MTda00226
 TTY~T~BI            0      6/29/88    7:04p  tty.txt.a002
 TTY~T~BM            0      6/29/88    7:36p  tty.txt.a003
 TEXT3~BN 0          0      6/29/88    7:36p  Text353.0
 EX058~BO        48128      7/01/88    6:10p  Ex05882
 TEXT2~BJ 0          0      6/29/88    7:04p  Text200.0
 TEXT3~BN 2          0      6/29/88    7:36p  Text353.2
 WINSE~BQ           88      7/01/88    5:20p  winselection
 TEXTS~BV           20      7/01/88    9:49a  textsw_shelf
 RX058~BW        10240      7/01/88    6:10p  Rx05882
 PCAT_~B3      1048576      7/01/88    5:50p  pcat_xpmem.3
 ~GETW~BK          256      7/01/88   10:40a  .getwd
 ~GETW~B4         8192      6/10/88    7:26p  .getwda07961
 ~GETW~B5         8192      6/10/88    7:29p  .getwda07964
```

If the filename extension is legal in MS-DOS after the upper/lowercase conversion, the extension is preserved. This procedure allows MS-DOS to rename UNIX files and preserve the original UNIX filename, altering only the extension.

CAUTION **Filename mapping is performed dynamically. It generates a unique name based on the order in which mapped names are requested. Consequently, a UNIX filename may map to different MS-DOS filenames at different times.**

Avoid building mapped names into MS-DOS application software. The first six characters of a mapped filename will remain the same; however, the seventh and eighth characters of the mapped filename will vary.

The following table lists examples of filename mapping. The "XX" represents the two-character map table index used by the file mapper.

Table 6-2 *File Mapping Examples*

UNIX Name	*Mapped File Name*	*Explanation*
abc123.def	ABC123.DEF	No mapping required.
a	A	No mapping required.
A	A~~~~XX	Wrong case.
along_name	ALONG~XX	Mapping usable characters.
AB.c	AB~~~XX.C	Only two usable characters.
Ab.c	AB~~~XX.C	The XX value is different from the above example because this example is a distinct mapping.
a.b.c	A~B~~XX.C	Illegal because of the syntax; the embedded periods are replaced by tildes (~) but the extension is legal.
abcd.efgh	ABCD~~XX	The extension has too many characters (three maximum).
.login	~LOGI~XX	A leading period always makes a name illegal. NOTE: This file would be treated as "hidden" in UNIX but not in MS-DOS.

This chapter has discussed the file redirector and the ways UNIX filenames are modified to fit MS-DOS conventions. The next chapter describes the other method of accessing the UNIX file system: PC-NFS.

7

Using PC-NFS

Using PC-NFS **115**

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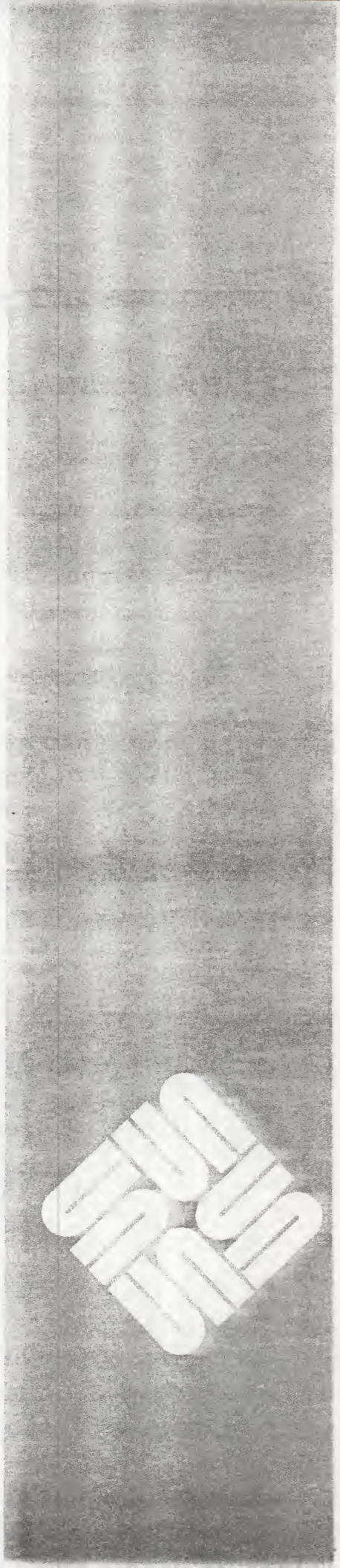

7

Using PC-NFS

This chapter describes the differences between implementing PC-NFS 3.0 under SunIPC 1.1 and SunIPC 1.2. This section also describes the steps to take if you prefer to configure PC-NFS 3.0 manually.

7.1. Accessing UNIX Files with PC-NFS

If you want to run PC-NFS, be sure that you have first installed the SunIPC 1.2 hardware and configured your system for SunIPC 1.2 before beginning to install PC-NFS.

In SunIPC 1.1, PC-NFS was implemented by creating a separate *backplane* Ethernet for each SunIPC host system. The host system was configured to act as a gateway to this SunIPC 1.1 PC-NFS network. SunIPC 1.2 implements a new network access scheme which eliminates the need for this separate network gateway by making the host system *listen* for Ethernet data destined for installed SunIPCs. Thus, in SunIPC 1.2, each SunIPC is treated as an independent machine on the same network as its host machine.

The following section describes how to configure PC-NFS manually according to SunIPC 1.2 standards. For information on how to configure PC-NFS according to SunIPC 1.1 standards, see the *SunIPC 1.2 Release Manual*.

If, while running the configuration program, you chose to install PC-NFS, then all the following steps have been done for you. If you have a non-standard network configuration, you should examine the files to be sure everything is correct for your network. If you decided not to run `ipc_configure`, you must do a manual installation.

Installing PC-NFS Manually for SunIPC 1.2

Use the following steps to install PC-NFS on your system manually.

Step 1:

To run `pcnfs`, install `pcnfsd` on your system. You may encounter difficulty if both of the following conditions are true. If only one of these conditions is true, there is no complication.

- You are running the Yellow Pages.

- You are not the YP Master. (You do not own the master database files). In this case, ask your YP administrator to change the `/etc/rpc` file and export the changes.

In `/etc/rpc` (on the YP master) add this entry:

```
pcnfsd      150001
```

Do the YP make:

```
% cd /var/yp
% make
```

In your local `/etc/inetd.conf`, add the following entry:

```
pcnfsd/1 dgram rpc/udp wait root /usr/pctool/etc/rpc.pcnfsd rpc.pcnfsd
```

If you are unable to have the Yellow Pages changed, you can install `pcnfsd` without changing the RPC database. Add the following entry:

```
# 150001
150001/1 dgram rpc/udp wait root /usr/pctool/etc/pcnfsd rpc.pcnfsd
```

The `150001` represents `pcnfsd`; change it once you get the `rpc.bynumber` database updated.

Step 2:

Add two lines in your `/etc/rc.local` file for each SunIPC board. If you have more than one SunIPC board, change `pc0` and `ipc0` to `pc1` and `ipc1`, `pc2` and `ipc2`, and so on.

```
ifconfig pc0 `hostname` `hostname`-ipc0 netmask + private
arp -s `hostname`-ipc0 `/usr/pctool/etc/myeaddr` pub
```

The `hostname` returns the name of your Sun host, and `myeaddr` returns the Sun's Ethernet address. Therefore, if your hostname is myhost, and it is on a Class C network with an address of 192.29.200.10, myhost-ipc0 should also be on network 192.29.200 (for example, 192.29.200.11).

Step 3:

Change the nfs `/usr/pctool/nfs/network.bat` initialization file, which is run when starting up the PC-NFS system.

All lines in this file must end with CTRL-M

```
NET YPDOMAIN <your domain name>
NET SUBNET <your subnet mask>
NET START RDR
```

The `net subnet` command is unnecessary if you are running a SunOS version later than SunOS 4.0.

You can find your domain name (on the Sun host) by typing

```
domainname
```

You can find your current network subnet mask by typing

/usr/pctool/etc/mynetmask

You can specify a variety of additional configuration options for PC-NFS. For more information, see the manual *PC-NFS*.

Step 4:

If you are subnetting and using the Yellow Pages, you must set the YP server manually. Insert the following line after the `net ypdomain` command in `/usr/pctool/nfs/network.bat`:

All lines in this file must end with CTRL-M

net ypset <ypserver name> *

All lines in this file must end with CTRL-M

You must also add the YP server name to the `/usr/pctool/nfs/hosts` file.

Step 5:

Once SunIPC is up and running, you need to reconfigure the drive C for each SunIPC to enable PC-NFS. To do so, first save your `config.sys` and `autoexec.bat` files. Then copy the `config.nfs` and `autoexec.nfs` files on drive C to `config.sys` and `autoexec.bat` , respectively. Then reboot the SunIPC to enable PC-NFS.

Step 6:

Reset the time zone to the appropriate value for your system by changing the `set TZ=` command in `autoexec.bat`.

Step 7:

Examine the `/usr/pctool/nfs/network.bat` file to see if it contains the proper values for your network. If you are not running the Yellow Pages, you may need to change some additional files in `/usr/pctool/nfs: hosts netgroup networks passwd`. See the manual *PC-NFS*.

8

Advanced Topics

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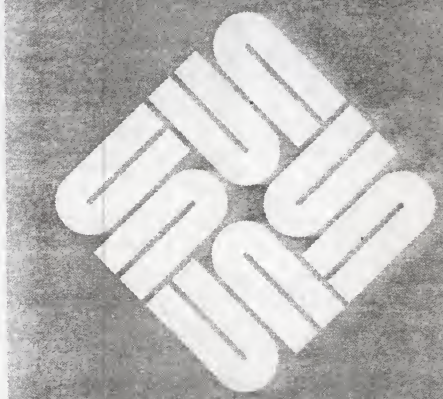

8

Advanced Topics

This chapter contains information that may be of interest to experienced users:

- `pctool` *Command Line Arguments and Environment Variables* — Provides the command options and environment variables of the `pctool` command.
- *The Default* `config.sys` *File* — Lists the contents of the default `config.sys` and `config.nfs` files.
- *The Default* `autoexec.bat` *File* — Lists the contents of the default `autoexec.bat` and `autoexec.nfs` files.
- *The Default Configuration File* — Lists the contents of the default `config.pcx file.`

8.1. `pctool` Command Line Arguments

The following list shows all of the optional arguments of the pctool command line.

`pctool -c` *commands*
Automatically executes an application's command file (; maps to Return—;; maps to ;)

`pctool -Wi`
Opens a SunIPC window as an icon

`pctool -d /dev/pcx`
Specifies one of multiple local SunIPC boards

`pctool -d` *nodename:*`[/dev/pcx]`
Specifies one of multiple remote SunIPC boards

`pctool -g`
Maps color IBM PC display data into the Sun gray scale

`pctool -s`
Changes large-resolution (1600 pixels wide) Sun displays to smaller displays

`pctool -l` *login name*
Allows use of an alternate login name when accessing a server

`pctool -p` *config file*
Permits specification of an alternate configuration file

`pctool -h`
Prints a short help message

`pctool -W` *window system arguments*
Signals the start of window parameter arguments

`pctool -force_type4kb`
Provides complete keyboard functionality when using a Type4 keyboard in Type4 mode under SunOS 4.0

8.2. `pctool` Environment Variables

In addition to the command line arguments, `pctool` uses the following environment variables:

Table 8-1 *pctool Environment Variables*

Variable	*Description*
HOME	Your home directory.
PCTOOLDIR	The directory that holds all the `pctool` files. The default is `/usr/pctool`.
CONFIG.PC	The configuration file to use. The -p flag takes precedence over the CONFIG.PC environment variable.
LPT1, LPT3:	To be compatible with SunIPC 1.1, the default printer configuration uses these environment variables to specify the printer command to use in printing a file.

You can use CONFIG.PC or the `-p` command option to create your own environment, regardlesss of the SunIPC board you have. These options will not work with remote access, however.

8.3. The Default `config.sys` File

The default `config.sys` file contains the following lines:

```
buffers = 20
files = 50
lastdrive = z
device = c:\ansi.sys
fcbs = 25,25
stacks = 0,0
```

`config.nfs` contains these additional lines:

```
device = c:\pcnfs /x
device = c:\sockdrv.sys
device = c:\ipcme.sys
```

8.4. The Default `autoexec.bat` File

The default `autoexec.bat` file contains the following lines:

```
echo off
prompt $p$g
redir
extend e:=$CD h:$HOME n:/usr/pctool r: \
path c:\;h:\pc;n:\msdos
e:
if exist e:autoexec.bat e:autoexec.bat
if exist e:autoexec.bat goto done
if exist h:\pc\autoexec.bat h:\pc\autoexec.bat
:done
```

`autoexec.nfs` looks like this:

```
echo off
prompt $p$g
redir
extend e:=$CD h:$HOME n:/usr/pctool r: \
path c:\;h:\pc;n:\msdos;n:\nfs
set TZ=PST8PDT
set NFSDRIVE=n
PRT *
NFSRUN
e:
if exist e:autoexec.bat e:autoexec.bat
if exist e:autoexec.bat goto done
if exist h:\pc\autoexec.bat h:\pc\autoexec.bat
:done
```

8.5. The Default Configuration File

These are the valid fields in the `config.pcx` file, and their default values:

Table 8-2 *Configuration File Fields and Default Values*

Name	*Default Value*
ROM	$PCTOOLDIR/rom_bios.pc
CMOS	$PCTOOLDIR/cmos_ram.pc*
DRIVE_C	$PCTOOLDIR/drive_C.pc*
TYPE_C	2
DRIVE_D	<no default>
TYPE_D	2
COM1	<no default>
COM2	<no default>
LPT1	eval ${LPT1:-lpr}
LPT3	eval ${LPT3:-'psfx80 $PCTOOLDIR/etc/psfx80.pro | lpr'}
XPMEM	1024
NORMFONT	$PCTOOLDIR/pcfont.r.14
BOLDFONT	$PCTOOLDIR/pcfont.b.14

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